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French agency for food, environmental
and occupational health & safety



Investigate, evaluate, protect

Assessment of the skin sensitising/irritant effects of chemicals found in footwear and textile clothing

ANSES Opinion
Collective Expert Appraisal Report

April 2018

Scientific publication



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The Director General

Maisons-Alfort, 27 April 2018

OPINION

of the French Agency for Food, Environmental and Occupational Health & Safety

on the "assessment of the skin sensitising/irritant effects of chemicals found in footwear and textile clothing"

ANSES undertakes independent and pluralistic scientific expert assessments.

ANSES primarily ensures environmental, occupational and food safety as well as assessing the potential health risks they may entail.

It also contributes to the protection of the health and welfare of animals, the protection of plant health and the evaluation of the nutritional characteristics of food.

It provides the competent authorities with the necessary information concerning these risks as well as the requisite expertise and technical support for drafting legislative and statutory provisions and implementing risk management strategies (Article L. 1313-1 of the French Public Health Code).

Its opinions are published on its website. This opinion is a translation of the original French version. In the event of any discrepancy or ambiguity the French language text dated 27 April 2018 shall prevail.

On 6 November 2014, ANSES received a formal request from the Directorate General for Competition Policy, Consumer Affairs and Fraud Control (DGCCRF) of the Ministry of the Economy, Industry and the Digital Sector and from the Directorate General for Health (DGS) of the Ministry of Social Affairs, Health and Women's Rights, to conduct an expert appraisal on the following: "Safety of footwear and textile clothing".

1. BACKGROUND AND PURPOSE OF THE REQUEST

Many cases of skin allergies and/or irritations *a priori* relating to textile clothing or footwear have been reported by the DGCCRF in recent years¹. Moreover, several national health and safety agencies in the other Member States of the European Union have published studies in order to identify the chemicals used in textiles² liable to be responsible for allergy cases.

These allergy cases can be attributed to various different causes:

- Many chemicals are used in the manufacture of textile articles and footwear;
- Many chemicals are used during the life cycle of textile clothing and footwear, particularly during transport and for their preservation and maintenance;

¹ DGCCRF surveys

² Chemicals in Textiles – Risks to human health and the environment. KEMI, 2014
Study on the Link between allergic reactions and chemicals in textile products. RPS, 2013

- When used by the consumer, many other factors can be involved, whether mechanical, physical, or relating to co-exposure.

ANSES's expert appraisal was requested by the DGS and the DGCCRF with the following aims:

- To identify any skin irritant or sensitising chemicals liable to be found in footwear and textile articles. If other relevant chemicals are identified, other than skin irritant or sensitising substances, they will also be included in the review of knowledge;
- To conduct a review of knowledge on the risks presented by the substances identified in the previous step:
 - ✓ a review of the existing literature in the field of human toxicology in order to identify the relevant routes of exposure and any existing toxicity reference values relevant to consumer exposure,
 - ✓ a review with the aim of assessing the prevalence of allergic phenomena attributed to the presence of these substances in textile clothing and footwear.
- To make recommendations regarding manufacture and, if applicable, preservation during shipment by considering the point of view of the final consumer;
- To issue an opinion on the advisability of limiting the use of some of the substances identified;
- To propose a methodology for investigating cases of skin allergy or intolerance reported by specialist physicians, in order to gain further knowledge about the substances in question.

The experts also examined the carcinogenic-mutagenic-reprotoxic (CMR) effects of the chemicals identified in the framework of this expert appraisal.

The main regulatory instruments governing textile clothing and footwear are as follows:

- Decree No. 96-477 of 30 May 1996 on the labelling of materials used in the main components of footwear offered for sale to consumers, which explains the requirements relating to this labelling.
- Annex XVII of Regulation (EC) No 1907/2006 (REACH), which imposes certain restrictions on hazardous substances in articles sold to the public and particularly textile products and/or footwear.
- Regulation (EU) No 1007/2011 of the European Parliament and of the Council of 27 September 2011 on textile fibre names and related labelling and marking of the fibre composition of textile products.

2. ORGANISATION OF THE EXPERT APPRAISAL

The expert appraisal was carried out in accordance with French Standard NF X 50-110 "Quality in Expert Appraisals – General Requirements of Competence for Expert Appraisals (May 2003)".

It falls within the sphere of competence of the Expert Committee (CES) on "Assessment of chemical risks of consumer items and products". ANSES entrusted the expert appraisal to several rapporteurs, also members of the aforementioned CES and Working Groups ("Vigilance for Chemical Products" WG), according to their fields of expertise. The methodological and scientific

aspects of the work were presented to the CES between 22 January 2015 and 21 December 2017. The work was adopted by the CES on "Assessment of chemical risks of consumer items and products" at its meeting on 21 December 2017.

ANSES analyses interests declared by experts before they are appointed and throughout their work in order to prevent risks of conflicts of interest in relation to the points addressed in expert appraisals. The experts' declarations of interests are made public via the ANSES website (www.anses.fr).

The Agency used the following expert appraisal method to respond to this request:

■ **Collection of information needed for carrying out the expert appraisal work**

Information collection was carried out as follows: analysis and summary of the scientific literature, extraction and exploitation of databases, summaries produced of the available toxicological data, studies carried out on articles of new textile clothing and footwear.

- A **review of studies** published between 2000 and 2016 on **contact dermatitis** caused by textile clothing or footwear was carried out. This analysis helped establish a link between the occurrence of contact dermatitis and a substance or group of substances found in the article in question.
- An **analysis of the various reports published** by European and French agencies was carried out to identify the potentially skin sensitising or irritant substances in textile clothing and footwear. These reports revealed the presence of a multitude of substances, either resulting from the article manufacturing process or added intentionally for the properties they confer to the article.

■ **Research and development agreements**

In order to respond to the questions in the formal request relating to identification of the skin irritant and/or sensitising substances found in textile clothing and footwear, two research and development agreements (CRDs) were established, respectively with the French Textile and Apparel Institute (IFTH) and the Technical Centre for Leather (CTC).

One of the objectives of these CRDs was to perform composition and migration tests on samples consisting of new textile clothing taken from several points of sale and footwear that had been the subject of complaints from customers. The sampling performed for these tests did not fully reflect the markets for textile clothing or footwear in France. It did however make it possible to:

- assess the composition of certain textiles/footwear regularly implicated by clinicians in the occurrence of cases of contact allergies,
- modify the groups of chemicals that had been identified by the literature review.

As part of the CRD protocol with the IFTH, tests were performed on 25 new articles of textile clothing that had been taken from supermarkets, clothing discount outlets and "mass market" clothing retailers.

The textiles chosen were those:

- in prolonged contact with the skin or in contact with the skin over a large surface area (underwear, leggings, jeggings/jeans, treggings),
- whose conditions of use generate excessive perspiration (sport clothing).

As part of the CRD protocol with the CTC, 14 articles of footwear were obtained by the CTC. These corresponded to articles for which problems of skin irritation or allergies had been reported by customers to the retailers/brands/suppliers.

Washing tests were conducted on the new textile articles in which chemicals such as dyes or nonylphenol ethoxylates had been quantified by the IFTH laboratory.

In response to the request for a literature review, for each of the substances detected or quantified by the laboratories, summarised data were collected covering the main physico-chemical characteristics, toxicokinetics, skin sensitising or irritant effects, chronic toxicity, and the CMR and endocrine-disrupting effects. Only effects observed following dermal exposure were recorded. In their absence, data on toxicity via the respiratory and then oral routes were sought.

■ **Biomedical study**

ANSES also undertook a **biomedical study** with the following objectives:

- To test the feasibility of a methodology for investigating cases of skin allergy or intolerance. This methodology sought to characterise the existence of an association between allergic dermatitis and the presence of chemicals in an article of textile clothing or footwear;
- To identify chemicals potentially responsible for contact dermatitis relating to an article of textile clothing or footwear whose sensitising nature has not been documented.

This study was not intended to be representative of all the cases of contact dermatitis relating to footwear or textile clothing over a given period. It was an exploratory study designed to identify allergenic substances. This 2016-17 study focused on:

- 25 cases³ of contact dermatitis relating to textile clothing,
- 17 cases of contact dermatitis relating to footwear.

³ A case relates to an article of footwear or textile clothing liable to be responsible for contact dermatitis, in a patient who consulted either a dermatologist-allergist from the Revidal-GERDA network or a physician from an occupational disease clinic (CCPP), or who contacted a poison control centre (CAP) participating in the study. The study excluded minors, adults protected by the law, pregnant and breastfeeding women, and individuals receiving immunosuppressive therapy.

The feasibility of the study was tested from 1 January to 30 September 2017. It required the participation of a sample of volunteer physicians specialised in dermatology-allergology and toxicology and consulting in a hospital environment. ANSES's partners were:

- 18 dermatologist-allergists from the Revidal-GERDA network,
- 8 poison control centres (CAPs),
- 4 occupational disease clinics (CCPPs),
- 2 textile and footwear testing laboratories.

Searching for the causality of one or more chemicals responsible for the occurrence of dermatitis was based on a protocol including:

- the results of the medical diagnosis including the usual allergological investigations,
- the results of the analyses of chemicals screened for in the textile clothing or footwear incriminated,
- where applicable, the results of additional "patch tests",
- the comparison of earlier data with the data from the literature analysis.

The descriptive analysis of the biomedical study protocol provided for the inclusion of the total number of patients received for consultation (distribution by sex and age), the number of patch tests, and the network used to recruit patients (Revidal-GERDA, CCPP or CAP).

The results of the first phase of the biomedical study between January and September 2017 are presented below.

3. ANALYSIS AND CONCLUSIONS OF THE CES ON "ASSESSMENT OF CHEMICAL RISKS OF CONSUMER ITEMS AND PRODUCTS"

■ **Literature data on the frequency of contact dermatitis**

No studies have assessed the prevalence of contact dermatitis induced by these articles in the general population. Only the positivity rate for tests in the populations investigated has been considered.

French data from the Dermato-Allergology Study and Research Group (GERDA) indicate positivity prevalences for patch tests for textile clothing ranging between 1 and 5%. For footwear, the prevalence in the patients investigated by the dermato-allergology centres was around 3 to 11%.

■ **Literature data for identification of the substances found in textile clothing and footwear**

The analysis of the studies carried out in the countries of the European Union helped identify the great diversity of chemicals that can be found in textile clothing or footwear and implicated in cases of skin allergies/irritations. In application of the REACH⁴ Regulation, a proposal to restrict substances classified as skin sensitising or irritating according to Regulation (EC) No 1272/2008

⁴ Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European chemicals agency

(the CLP Regulation)⁵ and found in textiles and leather articles is currently being submitted jointly by France and Sweden.

Furthermore, a restriction proposal is currently being considered by the European Commission in application of Regulation (EC) No 1907/2006 known as the REACh Regulation. This relates to Category 1A and 1B carcinogenic, mutagenic and reprotoxic substances found in textiles and footwear.

■ **List of chemicals screened for in footwear and textile clothing**

The list of chemicals screened for in textile clothing and footwear is available in **Annex 1**. It was drawn up jointly by the laboratories and the experts.

■ **Tests on the new textile clothing articles and footwear**

The results of the two studies carried out by the IFTH and the CTC on footwear and textile clothing are described below.

➤ Textile clothing

At the end of the tests, out of the 25 new textile clothing articles tested (see above), the CES experts noted that:

- **1,4-paraphenylenediamine (PPD)**, a recognised skin sensitising substance, was quantified in 20% of textile clothing articles,
- neither allergenic⁶ nor azo⁷ dyes were found, apart from **CI Disperse Yellow 23, an allergenic dye**,
- **heavy metals** (cobalt, copper, antimony, lead, cadmium, mercury) were quantified in 16% of samples,
- **chromium** was quantified in 20% of samples and **nickel** in 16% of samples,
- **nonylphenols (NPs)** and **nonylphenol ethoxylates (NPEOs)** were quantified in 20% of samples,
- two organotin substances (**dibutyltin dichloride** and **monobutyltin trichloride**) were quantified in one sample,
- **formaldehyde** and **polycyclic aromatic hydrocarbons (PAHs)** were never quantified.

Regarding the tests after washing, the CES experts noted that:

- **NPs** and **NPEOs** were removed by washing, which confirms the value of recommendations on use (namely washing before wearing the garment) at least with regard to these chemicals,
- the concentrations of **PPD** before and after washing did not diminish, they even increased. The first assumption made by the CES was that the dyes containing PPD in the textile clothing articles tested are not chemically stable and that washing can "break down" the dye and release the **PPD**. The second assumption is related to modification of the textile matrix after washing, making extraction more effective,

⁵ Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006

⁶ Dyes identified by the IFTH and the CTC for their allergenic skin effects (see Annex 1).

⁷ Dyes that by breaking down, release an aromatic amine (Annex XVII Entry 43 of the REACh Regulation).

- the change in the concentrations of allergenic dyes or aromatic amines after washing is difficult to interpret.

➤ Footwear

At the end of the tests on the 14 footwear articles analysed that were the subject of complaints by consumers (see above), the CES experts noted the following concerning the hazardous substances (sensitising or CMR) screened for:

- **Dimethylfumarate (DMFu)**, responsible for cases of sensitisation in 2011, was never found;
- All the leather parts tested had **chromium VI** (carcinogenic and skin sensitiser) concentrations of less than 3 mg/kg (regulatory limit defined in the REACH Regulation);
- No allergenic dyes were found among those tested.

In addition, the CES experts noted that:

- all the elastic contained **2-mercaptobenzothiazole** (skin sensitiser). It is not currently possible to link its presence with any certainty to the degradation of a particular compound, or to a step in the footwear manufacturing process,
- **rosin** (skin sensitiser) was found in 36% of the articles,
- **butylated hydroxytoluene (BHT)**, **formaldehyde** (carcinogenic and skin sensitiser), **orthophenyl phenol (OPP)** (skin irritant) and **4-chloro-3-methylphenol** (skin sensitiser) were found in several samples,
- **benzyl benzoate** (acute toxicity) was quantified in 21% of the articles,
- **acetophenone azine** was found in 14% of the articles. The CES stated that it would make sense to check whether the said footwear contains ethylene vinyl acetate foams, which would confirm the assumptions made about the possible presence of acetophenone azine as the degradation product during the manufacture of these foams.

■ Biomedical study

The results from this study are still provisional, pending finalisation of analytical tests on the articles and the assessment of several cases by the steering committee.

Between January and September 2017, 31 patients including 21 women (between 24 and 68 years old) and 10 men (between 27 and 64 years old) participated in the study. Patch tests were carried out for all these patients. Another patient was not able to take part because they were located too far away from the dermatologist-allergists in the study.

These 31 patients represented 42 cases⁸ including:

- 39 cases of patients that consulted a Revidal-GERDA physician,
- 1 case of a patient that contacted a CAP,
- 2 cases of patients that consulted a CCPP physician.

⁸ A case relates to an analysed article. Several articles may have been analysed for the same patient.

All the cases were presented to and discussed by the steering committee of the biomedical study. Out of these 42 cases:

- in six cases, a substance suspected by the physician as possibly responsible for sensitisation to the article was detected/quantified in this article. This concerned the following substances:
 - o **4-tert-butylphenol formaldehyde resin,**
 - o **nickel,**
 - o **chromium VI,**
 - o **rosin;**
- in two cases, it was concluded that the symptoms were unrelated to the article suspected;
- in eight cases, a substance suspected by the physician (following a positive patch test in the patient) was not detected/quantified in the article:
 - o in seven of these cases, no substance was detected/quantified in the article by the laboratory,
 - o in one case, the laboratory identified and quantified another substance that was not the one suspected by the doctor in the diagnosis: this was **benzidine**;
- in five cases, it was not possible to conclude as to the article's causality due to possible cross-contamination (cosmetics, paints, multiple treatments applied to the article (washing and ironing) or another protective article worn by the patient);
- lastly, 21 cases are currently being assessed by the steering committee.

From the list of substances screened for (Annex 1), the expert appraisal helped identify the following substances (detected or quantified):

For footwear	For textile clothing
formaldehyde 2-phenoxyethanol para-tert-butylphenol drometrizole chromium VI certain biocides (orthophenyl phenol, 4-chloro-3-methylphenol) butylated hydroxytoluene (BHT) 2-mercaptobenzothiazole benzyl benzoate nickel rosin benzyl alcohol 1-dodecanethiol triphenyl phosphate methyl, ethyl and propyl parahydroxybenzoates	aniline 1,4-paraphenylenediamine 3,3'-dimethoxybenzidine 4-aminoazobenzene benzidine NPs/NPEOs/octylphenol ethoxylates (OPEOs) Certain dyes (CI Disperse Yellow 23 and CI Disperse Orange 37/76) anthracene nickel chromium VI cadmium derivatives dibutyltin

To summarise:

- The presence of several substances of concern was confirmed or identified: for example, **1,4-paraphenylenediamine**, **aniline** and **benzyl benzoate** were quantified without their origin being identified;
- Substances known for their sensitising nature but not systematically screened for were found, such as **1,4-paraphenylenediamine**;
- Substances were detected in the article whose origin may be related to the packaging, storage or transport;
- **Acetophenone azine** was detected in different types of articles; its origin is unknown. The lack of knowledge on the toxicity of this substance prompted the toxicological tests in progress;
- The patch-tests were unable to identify all the substances that can induce a contact allergy, particularly with regard to the **aromatic amines** (dyes), mainly because not all the substances are available in the form of commercial allergens.

The biomedical study was used to establish a methodology for investigating cases of skin allergy or intolerance reported by specialist physicians, helping to:

- gain further knowledge of the substances in question,
- check, in some cases, the presence (or absence) of these substances in footwear and/or textile clothing and establish a link with any possible skin allergy or irritation in the patient. For example, **DMFu** and several **allergenic dyes**, which were specifically screened for, were never found in certain articles analysed,
- highlight the presence of **Category 1A-1B CMR substances**: formaldehyde, para-tert-butylphenol, chromium VI and nickel **in footwear**; 3,3'-dimethoxybenzidine, benzidine, 4-aminoazobenzene, PAHs, nickel, chromium VI and cadmium **in textile clothing**,
- identify articles that do not comply with the regulations in force,
- highlight the absence of analytical methods for thiurams, thioureas and dithiocarbamates,
- confirm that the regulatory thresholds for skin sensitising substances do not provide protection from elicitation⁹, particularly in the case of chromium VI.

■ **Recommendations of the CES**

On the basis of the above conclusions, the CES is issuing the following recommendations.

Recommendations by substance

- **1,4-paraphenylenediamine**: this substance should be systematically screened for, regardless of its origin, and its presence in textiles and footwear should be kept to a minimum.
- **Benzyl benzoate**: the possible involvement of this substance in the occurrence of contact dermatitis in a textile article or footwear made of a textile material should be assessed.

⁹ Elicitation: revelation of an allergic reaction in a person who has already been sensitised, following new exposure to the same allergen.

- Chromium VI:
 - o information on the presence of this compound in articles (consumer information) would facilitate secondary prevention,
 - o lowering the regulatory threshold in leather articles would limit the appearance of lesions in patients who are already sensitised.
- Dyes:
 - o toxicological data should be acquired on CI Disperse Orange 37/76 and Disperse Yellow 23,
 - o among the three dyes quantified in the biomedical study (CI Disperse Brown 1, CI Disperse Yellow 14 and CI Disperse Yellow 42), additional patch tests are currently under way in order to verify their role in the occurrence of contact dermatitis in the affected patients.
- Alkylphenols and alkylphenol ethoxylates:
 - o a restriction on the use of NPEOs and NPs in textile articles will come into effect in February 2021. It implies a maximum NPEO concentration of 0.01%w. This restriction will decrease the upstream use of nonylphenols, thereby reducing human exposure to these substances,
 - o it is recommended that any textile article in contact with the skin be washed before it is worn for the first time, in order to reduce the concentration of these substances.
- Methyl, ethyl and propyl parahydroxybenzoates (parabens): their origin and their role in the occurrence of skin disorders should be studied.
- Butylated hydroxytoluene (BHT): changes to the REACH Regulation regarding this substance should be monitored.
- 2-phenoxyethanol: its presence in textiles and footwear should be restricted.
- Cadmium and its compounds: the presence of cadmium and those of its derivatives that have been classified as carcinogens should be restricted in textile articles and footwear.
- Nickel: a regulatory limit for the use of nickel in textile articles should be defined.
- 2-mercaptobenzothiazole: given this substance's classification as a skin sensitiser, its presence in footwear should be restricted or indicated.
- Biocides: monitoring should be continued for orthophenyl phenol (OPP), 2-(thiocyanomethylthio)-benzothiazole (TCMTB), 4-chloro-3-methylphenol (or chlorocresol) and octylisothiazolinone (OIT).
- Aniline: its presence in textile articles and footwear should be restricted/prohibited regardless of the origin (dye degradation or intentional addition).

- Formaldehyde and para-tert-butylphenol: a restriction measure led by the European Commission as part of the REACH Regulation is currently being considered for formaldehyde. Para-tert-butylphenol should be substituted in glues or resins.
- Drometrizole: the occurrence of allergic reactions related to the presence of drometrizole in textile articles and footwear should be monitored.
- Other substances: 3,3'-dimethoxybenzidine, benzidine, 4-aminoazobenzene, dibutyltin, benzyl alcohol, 1-dodecanthiol, triphenyl phosphate, rosin and anthracene may be involved in skin sensitisation/irritation relating to textile clothing and footwear. As these substances were only quantified once or only detected, it is recommended that investigations be conducted to confirm their presence and determine their concentrations in footwear and textile clothing.

Recommendations for the medical community regarding the biomedical study protocol

The biomedical study conducted as part of this expert appraisal was an initial exploratory study. After a first review, the decision was made to extend this study (2017-2018). A second phase of the study thus began in October 2017 and will end in October 2018. Improvements have been made to the protocol of the exploratory study, including:

- o increasing the number of physicians participating in the study,
- o broadening the scope of the study to include bed and bath linen,
- o the option of exploring a larger number of cases to be included,
- o lengthening the study duration.

The experts also recommend that the scheme for investigating the causality of cases of dermatitis from footwear and textile clothing be **secured for the longer term**.

To this end, the following will be necessary:

- better initial care for the patient with the use of dermatologist-allergists through an optimised territorial coverage of the biomedical study. Including dermatologist-allergists outside hospital centres will achieve this objective;
- In addition to medical care, establishment of a channel for dispatching and analysing the suspect articles;
- dissemination of information to the medical and scientific community about the existence of this study protocol.

This protocol should also be integrated in vigilance schemes at regional (Regional Vigilance and Support Network - RREVA) and national (ANSES, DGS) level, as well as in surveillance schemes (Departmental Directorate for the Protection of Populations - DDPP, DGCCRF).

Regarding the analysis of textiles and footwear, screening for substances should not just be limited to substances subject to regulation, nor to the detection/quantification of substances with thresholds defined by regulations. In view of this, the list of substances defined in Annex 1 will serve as the basis for these analyses.

Recommendations for the organisations responsible for placing products on the market

The CES experts recommend that the organisations responsible for placing products on the market ensure that there are no skin sensitising or irritating substances present at levels liable to have effects on consumer health (added intentionally, or resulting from manufacturing or contamination during storage and/or transport). In view of this, the list of substances defined in Annex 1 will serve as the basis for these analyses. If the absence of skin irritant or sensitising substances cannot be guaranteed, their presence in the articles should be reduced to a minimum and they should at the very least be mentioned on the labelling.

The CES experts encourage the organisations responsible for placing products on the market to gain a better understanding of the exact composition of their products and to provide information to physicians in the event of adverse effects. To this end, in relation to some of the cases from the biomedical study (still under investigation), it seems relevant to consider additional analyses by thermal extraction in order to identify markers or degradation products of substances added intentionally or resulting from manufacturing processes.

Recommendations for the chemical analysis laboratories

The measurement standards currently in force enable certain substances known to be skin sensitisers or irritants to be screened for and quantified. However, the thresholds defined in these standards cannot always protect already-sensitised individuals from elicitation. In some cases, the regulatory thresholds have been established on the basis of the analytical thresholds available when the standards were drawn up. The CES experts therefore recommend encouraging laboratories to reduce the existing detection and quantification thresholds.

Recommendations for consumers

Consumers should be reminded of the importance of washing any textile clothing in contact with the skin before it is worn for the first time, by following the washing recommendations formulated by the manufacturer. An information campaign could therefore be conducted by the national players.

Recommendations for the public authorities

The CES experts underline the fact that many substances, whose use is restricted or prohibited under the REACH Regulation, are found in footwear or textile clothing. The CES therefore reiterates the importance of the controls in the textile and footwear sector to avoid the presence on the French market of articles that do not comply with the regulations, and recommends at the very least maintaining this control pressure.

The experts recommend revising the existing regulatory thresholds under the REACH Regulation, for chromium VI and nickel. They also recommend determining regulatory thresholds for the following substances: 1,4-paraphenylenediamine, 2-phenoxyethanol, cadmium, 2-mercaptobenzothiazole, aniline and drometrizole.

The CES experts recommend establishing a consumer information campaign on the importance of washing clothing before it is worn for the first time.

The CES experts recommend that the presence of skin sensitising substances be mentioned systematically on the packaging and/or labelling of footwear or textile clothing.

The CES experts encourage the European adoption of the restriction measure being considered at European level concerning CMR substances used in textile articles.

The CES experts recommend that the requirement to provide information on composition (including substances added intentionally, or resulting from manufacturing or contamination during storage and/or transport) be extended to textile clothing articles and footwear, in a similar way to what is stipulated for mixtures by the toxicovigilance scheme.

4. AGENCY CONCLUSIONS AND RECOMMENDATIONS

This expert appraisal sought to:

- identify the skin irritant or sensitising chemicals, regulated or non-regulated, liable to be found in footwear and textile articles,
- conduct a review of knowledge on the toxicity and the different risks presented by these substances,
- formulate recommendations regarding manufacture and, if applicable, preservation during shipment, by considering the point of view of the final consumer,
- issue an opinion on the advisability of limiting the use of some of the substances identified,
- propose a methodology for investigating cases of skin allergy or intolerance reported by dermatologist-allergists in order to gain further knowledge about the substances in question.

The French Agency for Food, Environmental and Occupational Health & Safety endorses the conclusions and recommendations of its CES.

As part of this expert appraisal, a list of chemicals of interest was drawn up on the basis of:

- a literature search based on reports from the European bodies,
- the substances subject to regulation,
- the substances identified by the IFTH and the CTC with which ANSES has established research and development agreements in the framework of this expert appraisal.

This compiled list (see Annex 1) contains both substances known for their toxicity (CMR effect, skin irritant or sensitiser) and also substances identified as liable to be of a skin irritating and/or sensitising nature. It contains around 20 groups of compounds for textile clothing and around 50 substances for footwear.

In addition, a protocol involving a network of dermatologist-allergists and two chemical analysis laboratories was established by ANSES to investigate and examine the links between the clothing articles or footwear and the substances suspected of being responsible for the cases of skin allergy or intolerance reported by these physicians. The results from the implementation of the first phase of the study have confirmed the occurrence of cases of contact dermatitis (allergic or irritative) in consumers associated with the wearing of textile clothing or footwear.

However, it should be noted that for feasibility reasons, this study is not exhaustive and does not reflect all the footwear and textile clothing placed on the market in France.

The results obtained from the first phase of the biomedical study show that some of the cases of dermatitis can be explained by exposure to substances:

- identified in the CLP Regulation as skin irritant or sensitising substances (4-tert-butylphenol formaldehyde resin, chromium VI – even at concentrations that comply with the current regulations, rosin and nickel),
- not classified as skin sensitising or irritant under the CLP Regulation (for example, degradation of dyes into aromatic amines).

ANSES therefore recommends limiting consumer exposure as much as possible to the skin sensitising or irritant substances that can be found in textile clothing liable to come into contact with the skin and in footwear.

ANSES supports the measures being undertaken at European level in the framework of the REACH Regulation concerning:

- the restriction on skin sensitisers/irritants in textiles. A joint proposal has been produced by France and Sweden, for which the Agency worked with KEMI, the Swedish Chemicals Agency;
- the restriction of substances classified as 1A-1B CMR (proven or presumed carcinogens) in textiles intended for consumers, led by the European Commission. The substances covered by this restriction are mainly PAHs, phthalates, azo dyes and heavy metals, for which regulatory thresholds will be determined;
- the restriction on formaldehyde and formaldehyde releasers in preparations or articles, led by the European Commission.

Lastly, ANSES recommends:

For the authorities:

- maintaining control pressure for footwear and textile clothing placed on the market, to avoid the presence of articles that do not comply with the regulations (containing CMR substances or skin sensitising substances, found at concentrations higher than those authorised),
- reviewing the relevance of the regulatory threshold for chromium VI in textiles on the basis of the results of the biomedical study,
- setting a regulatory threshold for nickel in textiles,
- adopting a classification as "skin sensitiser and/or irritant" for non-regulated substances identified as responsible for skin allergies, in the framework of the CLP Regulation.

For the organisations responsible for placing footwear or textile clothing on the market:

- ascertaining with their suppliers the absence of CMR or skin sensitising or irritating substances in the footwear or textile clothing placed on the market, at levels above the regulatory thresholds and liable to have effects on consumer health (added intentionally, or resulting from manufacturing or contamination during storage and/or transport),
- working at interprofessional level to develop an appropriate information system (labelling, packaging) for indicating, especially to populations that are already sensitised, the potential presence of such substances in the event that this absence cannot be guaranteed by the organisations responsible for placing the products on the market,
- carrying out studies to acquire toxicological data on the dyes highlighted during the biomedical studies and for which patch testing is not available.

For the chemical analysis laboratories:

- developing patch testing for detecting cases of allergies to allergenic substances, particularly azo dyes.

For the general population:

- reminding them of the importance of washing any textile clothing likely to come in contact with the skin before it is worn for the first time, by following the washing recommendations issued by the manufacturer.

Following the second phase of the biomedical study, which will end in October 2018, ANSES will supplement this opinion in order to rule on the results and how they should be taken into account in the identification of cases of dermatitis liable to be associated with allergenic or sensitising chemicals found in footwear or textile clothing.

Dr Roger GENET

KEYWORDS

Textile, article chaussant, allergie cutanée, élicitation, irritation, sensibilisation, habillement, étude biomédicale.

Textile, footwear, skin allergy, irritation, elicitation, sensitisation, garment, biomedical study.

ANNEX 1: LIST OF SUBSTANCES SCREENED FOR IN FOOTWEAR AND TEXTILE CLOTHING

List of substances screened for by the chemical analysis laboratory on textile clothing using solvent extraction or thermal desorption

Compounds analysed	Substances	CAS No.	Regulatory restrictions
Substances for solvent extraction			
Aromatic amines (azo dyes)	4-chloroaniline	106-47-8	REACH restriction: 0.003% _w (expressed in aromatic amines)
	4-methyl-m-phenylenediamine	95-80-7	
	4,4'-diaminodiphenylmethane	101-77-9	
	O-aminoazotoluene	97-56-3	
	3,3'-dichlorobenzidine	91-94-1	
	4,4'-methylenedi-o-toluidine	838-88-0	
	4,4'-methylenebis [2-chloroaniline]	101-14-4	
	2,4, 5-	137-17-7	
	O-anisidine	90-04-0	
	2-naphthylamine	91-59-8	
	3,3'-dimethoxybenzidine o-dianisidine	119-90-4	
	4,4'-bi-o-toluidine	119-93-7	
	4,4'-oxydianiline	101-80-4	
	4,4'-thiodianiline	139-65-1	
	4-aminoazobenzene	60-09-3	
	4-Chloro-o-toluidine	95-69-2	
	4-methoxy-m-phenylenediamine	615-05-4	
	5-nitro-o-toluidine	99-55-8	
	2-methoxy-5-methylbenzeneamine	120-71-8	
	Benzidine	92-87-5	
4-aminobiphenyl xenylamine	92-67-1		
O-toluidine	95-53-4		
APs/APEOs	NPs: 4-nonylphenol, branched	84852-15-3	REACH restriction: 0.1% _w
	NPEOs: 4-nonylphenol ethoxylates	26027-38-3	
	OPEOs: octylphenol ethoxylate	9002-93-1	
	4-tert-octylphenol	140-66-9	
	4-n-octylphenol	1806-26-4	
Allergenic dyes (list of dyes known for their skin allergenic effects, defined by the IFTH)	C.I. Disperse Red 11	2872-48-2	/
	C.I. Disperse Orange 37=76	13301-61-6	/
	C.I. Disperse Yellow 9	6373-73-5	/
	C.I. Disperse Blue 1	2475-45-8	/
	C.I. Disperse Blue 3	2475-46-9	/
	C.I. Disperse Blue 7	3179-90-6	/
	C.I. Disperse Blue 26	3860-63-7	/
	C.I. Disperse Blue 35	12222-75-2	/
	C.I. Disperse Blue 102	12222-97-8	/
	C.I. Disperse Blue 106	12223-01-7	/
	C.I. Disperse Blue 124	61951-51-7	/
C.I. Disperse Brown 1	23355-64-8	/	

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	C.I. Disperse Orange 1	2581-69-3	/
	C.I. Disperse Orange 3	730-40-5	/
	C.I. Disperse Orange 11	82-28-0	/
	C.I. Disperse Orange 37	12223-33-5	/
	C.I. Disperse Orange 76	13301-61-6	/
	C.I. Disperse Orange 149	85136-74-9	/
	C.I. Disperse Red 1	2872-52-8	/
	C.I. Disperse Red 17	3719-89-3	/
	C.I. Disperse Yellow 1	119-15-3	/
	C.I. Disperse Yellow 3	2832-40-8	/
	C.I. Disperse Yellow 23	6250-23-2	/
	C.I. Disperse Yellow 39	12236-29-2	/
	C.I. Disperse Yellow 49	54284-37-2	/
	C.I. Basic Red 9	569-61-9	/
	C.I. Basic Violet 3	548-62-9	/
	C.I. Basic Blue 26	2580-56-5	/
	Basic Fuchsin	632-99-5	/
	C.I. Basic Violet 14	68308-40-7	/
	C.I. Direct Black 38	1937-37-7	/
	C.I. Direct Blue 6	2602-46-2	/
	C.I. Direct Brown 95	16071-86-6	/
	C.I. Direct Red 28	573-58-0	/
	C.I. Solvent Yellow 1	60-09-3	/
	C.I. Solvent Yellow 3	97-56-3	/
Other dyes	1-phenylazo-2-naphthol (Solvent Yellow 14)	842-07-9	/
Formaldehyde	Formaldehyde	50-00-0	Substance subject to authorisation according to the REACH Regulation
PAHs	Benzo[a]pyrene	50-32-8	REACH restriction: 0.0001% _w (1mg/kg)
	Acenaphthene	83-32-9	
	Acenaphthylene	208-96-8	
	Anthracene	120-12-7	
	Benzo[a]anthracene	56-55-3	
	Benzo[e]pyrene	192-97-2	
	Benzo[b]fluoranthene	205-99-2	
	Benzo[g,h,i]perylene	191-24-2	
	Benzo[k]fluoranthene	207-08-9	
	Benzo[j]fluoranthene	205-82-3	
	Chrysene	218-01-9	
	Cyclopenta[c,d]pyrene	27208-37-3	
	Dibenzo[a,h]anthracene	53-70-3	
	Dibenzo[a,e]pyrene	192-65-4	
	Dibenzo[a,h]pyrene	189-64-0	
Dibenzo[a,i]pyrene	189-55-9		
Dibenzo[a,l]pyrene	191-30-0		

	Fluoranthene	206-44-0	
	Fluorene	86-73-7	
	Indeno[1,2,3-cd]pyrene	193-39-5	
	Naphthalene	91-20-3	
	Phenanthrene	85-01-8	
	Pyrene	129-00-0	
	1-methylpyrene	2381-21-7	
	Butylated hydroxytoluene (BHT)	128-37-0	
Metals	Cadmium	7440-43-9	REACH restriction: 0.01% _w of plastic material
	Chromium	7440-47-3	
	Nickel	7440-02-0	REACH restriction: Release of Ni < 0.5µg/cm ² /week
	Chromium VI	18540-29-9	REACH restriction: 0.0003% _w (3mg/kg) in leather
	Antimony	7440-36-0	/
	Arsenic	7440-38-2	
	Lead	7439-92-1	REACH restriction: Accessible Pb 0.05% _w and if any possibility of children putting it in their mouths
	Cobalt	7440-48-4	/
	Copper	7440-50-8	/
	Mercury	7439-97-6	/
Organotins	Tributyltin chloride	1461-22-9	REACH restriction: 0.1% _w of tin
	Dibutyltin oxide	818-08-6	
Substances for thermal desorption			
Carboxylic acids	Acetic acid	64-19-7	/
	Octanoic acid	124-07-2	/
	Nonanoic acid	112-05-0	/
	Methyl dodecanoate	111-82-0	/
Alkanes	2,6,10,14-tetramethyl-pentadecane	1921-70-6	/
Alcohols	2-ethyl-1-hexanol	104-76-7	/
	Phenol	108-95-2	/
	Cyclohexanol	108-93-0	/
	2-phenoxy-ethanol	122-99-6	/
	Ethanol	64-17-5	/
	1-propanol	71-23-8	/
Aldehydes	Heptanal	111-71-7	/
	Benzaldehyde	100-52-7	/
	Nonanal	124-19-6	/
	Heptanal	111-71-7	/
	Octanal	124-13-0	/
	Acetaldehyde	75-07-0	/
Amides	N-methyl-N-phenylformamide	93-61-8	/

Ketones	2,6-bis(1,1-dimethylethyl)-2,5-cyclohexadiene-1,4-dione	719-22-2	/
	2-butanone	78-93-3	/
Esters	Methyl palmitate	112-39-0	/
	Methyl tetradecanoate	124-10-7	/
	Methyl laurate	111-82-0	/
	Benzyl benzoate	120-51-4	/
	Ethyl citrate	77-93-0	/
	Methyl acrylate	96-33-3	/
Benzene hydrocarbons	Benzene	71-43-2	/
	Toluene	108-88-3	/
	Styrene	100-42-5	/
	2-phenylpropene	98-83-9	/
Polycyclic aromatic hydrocarbon	2-methyl-naphthalene	91-57-6	REACH restriction: 0.0001% _w (1mg/kg)
	Biphenyl	92-52-4	
Lactams	Caprolactam	105-60-2	/
Phthalates	Diethyl phthalate	84-66-2	/
Sulphur	Sulphur dioxide	05/09/7446	/
Ether	2,5-dihydrofuran	1708-29-8	/
	1,4-Dioxane	123-91-1	/

List of substances tested in footwear

Substances	CAS number	Regulatory restrictions
Chromium VI (only on the leather parts)		REACH restriction: 0.0003% _w (3mg/kg) in leather
Formaldehyde	50-00-0	Substance subject to authorisation according to the REACH Regulation
Allergenic dyes ¹⁰	/	/
DMFu	624-49-7	REACH restriction: 0.1 mg/kg
Nickel (on the metal parts in contact with the skin)	7440-02-0	REACH restriction: Release of Ni < 0.5µg/cm ² /week metal articles
Heavy metals (cobalt, cadmium, total chromium, lead)		REACH restriction: Accessible Pb 0.05% _w and if any possibility of children putting it in their mouths and REACH restriction Cd: 0.01% _w of plastic material

¹⁰ Allergenic dyes: Disperse Blue 1, Disperse Blue 3, Disperse Blue 7, Disperse Blue 26, Disperse Blue 35, Disperse Blue 102, Disperse Blue 106, Disperse Blue 124, Disperse Brown 1, Disperse Orange 1, Disperse Orange 3, Disperse Orange 37/76/59, Disperse Orange 149, Disperse Red 1, Disperse Red 11, Disperse Red 17, Disperse Yellow 1, Disperse Yellow 3, Disperse Yellow 9, Disperse Yellow 23, Disperse Yellow 39, Disperse Yellow 49

Substances	CAS number	Regulatory restrictions
Aromatic amines ¹¹	/	REACH restriction: 0.003% _w (expressed in aromatic amines)
NMP	872-50-4	/
2-hydroxymethyl methacrylate ¹²	868-77-9	/
Benzyl alcohol	100-51-6	/
2-methyl-4-isothiazolin-3-one (MIT)	2682-20-4	/
Para-tert-butylphenol	98-54-4	/
5-chloro-2-methyl-4-isothiazolin-3-one (CMIT)	26172-55-4	/
Resorcinol	108-46-3	/
4-chloro-3-methylphenol	59-50-7	/
Ethylene-glycol dimethacrylate ³⁵	97-90-5	/
Phthalic anhydride	85-44-9	/
2,6-toluene diisocyanate	584-84-9	/
2,4-toluene diisocyanate	91-08-7	/
2-phenoxyethanol	122-99-6	/
4-tert-butylcatechol	98-29-3	/
Orthophenylphenol (OPP)	90-43-7	/
1-dodecanethiol	112-55-0	/
1,2-benzisothiazol-3(2H)-one (BIT)	2634-33-5	/
Isophorone diisocyanate (*)	4098-71-9	/
Benzyl benzoate	120-51-4	/
1,3-dibutyl-2-thiourea	109-46-6	/
2-octylisothiazol-3(2H)-one (OIT)	26530-20-1	/
Hydroquinone monobenzyl ether	103-16-2	/
2-mercaptobenzothiazole	149-30-4	/
Drometrizole	2440-22-4	/
4-aminoazobenzene	60-09-3	/
4,4'-diisocyanate diphenylmethane (*)	101-68-8	/
2-(thiocyanomethylthio)-benzothiazole (TCMTB)	21564-17-0	/
Bisphenol A	80-05-7	/
Triphenylphosphate	1330-78-5	/
Tricresyl phosphate	115-86-6	/
Methyl dehydroabietate ^{†13}	1235-74-1	/
Methyl abietate [†]	127-25-3	/

¹¹ Aromatic amines: 4-aminobiphenyl (CAS = 92-67-1), benzidine (CAS = 92-87-5), 4-chloro-*o*-toluidine (CAS = 95-69-2), 2-naphthylamine (CAS = 91-59-8), *o*-aminoazotoluene (CAS = 97-56-3), 5-nitro-*o*-toluidine (CAS = 99-55-8), 4-chloroaniline (CAS = 106-47-8), 4-methoxy-*m*-phenylene diamine (CAS = 615-05-4), 4,4'-diaminobiphenylmethane (CAS = 101-77-9), 3,3'-dichlorobenzidine (CAS = 91-94-1), *o*-dianisidine (CAS = 119-90-4), 3,3'-dimethylbenzidine (CAS = 119-93-7), 4,4'-dimethylene di-*o*-toluidine (CAS = 838-88-0), *p*-cresidine (CAS = 120-71-8), 4,4'-methylene-bis-(2-chloro-aniline) (CAS = 101-14-4), 4,4'-oxydianiline (CAS = 101-80-4), 4,4'-thiodianiline (CAS = 139-65-1), *o*-toluidine (CAS = 95-53-4), 4-methyl-*m*-phenylene diamine (CAS = 95-80-7), 2,4,5-trimethylaniline (CAS = 137-17-7), *o*-anisidine (CAS = 90-04-0), 4-aminoazobenzene (CAS = 60-09-3), 2,4-xylidine (CAS = 95-68-1), 2,6-xylidine (CAS = 87-62-7).

¹² Marker of the use of glues containing acrylates

¹³ When three out of the five substances containing the symbol † are detected, it is considered that rosin has been found in the sample.

(*) If there is any suspicion of the presence of free isocyanates after the first analysis from ultrasound extraction, an additional analysis using SPME/GC-MS is performed to confirm or refute the result.

Substances	CAS number	Regulatory restrictions
Palustric acid [†]	1945-53-5	/
Dehydroabietic acid [†]	1740-19-8	/
Abietic acid [†]	514-10-3	/
Glutaraldehyde	11-30-8	/
Acetophenone azine	729-43-1	/
Paraphenylenediamine	106-50-3	/
Benzothiazole	95-16-9	/
Butylated hydroxytoluene (BHT)	128-37-0	/
Thiurams	/	/
Parabens (methyl, ethyl, propyl)	/	/

In addition to the substances initially planned, the laboratory included the following substances in the tests. These substances are liable to be allergenic and/or were already found in previous analyses:

- 1,4-butandiol diglycidyl ether (CAS: 2425-79-8);
- 3-iodo-2-propynyl carbamate (IPBC) (CAS: 55406-53-6);
- N-N'-diphenylguanidine (CAS: 102-06-7);
- N,N'-diphenyl thiourea (CAS: 102-08-9);
- N-ethyl aniline (CAS: 103-69-5);
- Bisphenol A diglycidyl ether (CAS: 1675-54-3);
- 1,6-hexamethylene diisocyanate (CAS: 822-06-0).

Safety of footwear and textile clothing

Request No. 2014-SA-0237 "Textiles"

Collective Expert Appraisal REPORT

Expert Committee on "Consumer Products"

December 2017

Key words

Textile, chaussure, allergie cutanée, irritation, sensibilisation, habillement, étude biomédicale.
Textile, footwear, skin allergy, irritation, sensitisation, garment, biomedical study.

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PREAMBLE: The expert members of the Expert Committees and Working Groups or designated rapporteurs are all appointed in a personal capacity, *intuitu personae*, and do not represent their parent organisation.

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Acronyms and abbreviations

ANSES	<i>Agence Nationale de Sécurité Sanitaire de l'alimentation, de l'environnement et du travail</i> [French Agency for Food, Environmental and Occupational Health & Safety]
BIT	1,2-benzisothiazol-3(2H)-one
BHT	Butylated hydroxytoluene
BfR	<i>Bundesinstitut für Risikobewertung</i> [German Federal Institute for Risk Assessment]
CAPTV	Poison Control and Monitoring Centre
CCPP	Occupational Disease Clinic
CES	ANSES Expert Committee
CLP	<i>Classification Labelling and Packaging</i>
CMIT	5-chloro-2-methyl-4-isothiazol-3-one
CMR	Carcinogenic, Mutagenic, Reprotoxic
CO	Cotton
COFIL	Steering Committee
VOC	Volatile organic component
CRD	Research and development agreement
CTC	<i>Centre Technique du Cuir</i> [Technical Centre for Leather]
Danish EPA	Danish Environmental Protection Agency
DBT	Dibutyltin
DBTC	Dibutyltin dichloride
DDT	Dichlorodiphenyltrichloroethane
DGCCRF	<i>Direction Générale de la Concurrence, de la Consommation et de la Répression des Fraudes</i> [Directorate General for Competition Policy, Consumer Affairs and Fraud Control]
DGS	<i>Direction Générale de la Santé</i> [Directorate General for Health]
DMAC	Dimethylacetamide
DMF	Dimethylformamide
DMFu	Dimethylfumarate
DMTBS	Dimethylthiocarbamylbenzothiazole sulfide
DNEL/DMEL	Derivative No Effect Level / Derivative Minimum Effect Level
EA	Elastane
ECHA	European CHemicals Agency
EPA	Environmental Protection Agency
EtFASE	N-Ethylperfluoroalkane sulfon amidoethanol
EVA	Ethyl Vinyl Acetate
FASA	Perfluoroalkane sulfonamides
FCD	<i>Fédération du commerce et de la distribution</i> [French Trade and Retail Federation]
FTAC	Fluorotelomer acrylate
FTCA	Fluorotelomer sulfonic acids
FTMAC	Fluorotelomer methacrylate
GOTS	Global Organic Textile Standard

PAH	Polycyclic aromatic hydrocarbon
HBCD	Hexabromocyclododecane
ICDRG	International Contact Dermatitis Research Group
IFTH	<i>Institut Français du Textile et de l'Habillement</i> [French Textile and Apparel Institute]
IPCB	3-iodo-2-propynyl carbamate
JOCA	Japan Overseas Cooperative Association
KEMI	Swedish Chemicals Agency
LD	Limit of detection
LQ	Limit of quantification
MBT	2-mercaptobenzothiazole
MeFASA	N-methyl perfluoroalkane sulfonamide
MeFASE	N-methyl perfluoroalkane sulfonamidoethanol
MIT	Methylisothiazolinone
MBTC	Monobutyltin trichloride
NAICS	North American Industry Classification System
NMP	N-methylpyrrolidone
NP	Nonylphenol
NPEO	Nonylphenol ethoxylate
OIT	2-octylisothiazol-3(2H)-one
OPEO	Octylphenol ethoxylate
OPP	Orthophenyl phenol
OSHA	Occupational Safety and Health Administration
OTA	Organic Trade Association
PA	Polyamide/Nylon
PBB	Polybrominated biphenyl
PBDE	Polybrominated diphenyl ether
PBT	Persistent, Bioaccumulative, Toxic
PCB	Polychlorinated biphenyl
PCMC	4-chloro-3-methylphenol
ED	Endocrine disruptor
SPE	Synthetic polyester
PFOS	Perfluorooctanesulfonic acid
PFSA	Perfluoroalkane sulfonic acid
PFCA	Perfluoroalkyl carboxylic acid
POP	Persistent organic pollutant
PPD	1,4-paraphenylenediamine
PTBPF	Para-tert-butylphenol formaldehyde resin
PU	Polyurethane
QSAR	Quantitative structure-activity relationship
RAPEX	Rapid Alert System for non-food dangerous products
REACH	Regulation (EC) No 1907/2006 of 18/12/06 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

RIVM	<i>Rijksinstituut voor Volksgezondheid en Milieu</i> [Netherlands National Institute for Public Health and the Environment]
RMOA	Risk Management Option Analysis
RREVA	Regional Vigilance and Support Network
RTU	Emergency telephone hotline
SIDAPA	<i>Società Italiana di Dermatologia Allergologica Professionale e Ambientale</i> [Italian Society of Occupational and Environmental Allergic Dermatology]
STOT	Single Target Organ Toxicity - Repeated Exposure
SVHC	Substances of Very High Concern
TCMTB	2-(thiocyanomethylthio)-benzothiazole
TCPP	Tris(2-chloro-1-methylethyl) phosphate
TDM	Textile Dye Mix
vPvB	very Persistent and very Bioaccumulable
ZDHC	Zero Discharge of Hazardous Chemicals

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1 Background, purpose and procedure for carrying out the expert appraisal

1.1 Background

On 6 November 2014, ANSES received a formal request from the Directorate General for Health (DGS) and the Directorate General for Competition Policy, Consumer Affairs and Fraud Control (DGCCRF) to assess the safety of footwear and textile clothing.

Several cases of skin allergies and/or irritations a priori relating to textile clothing or footwear have been reported by the DGCCRF¹ in recent years. Moreover, several national health and safety agencies in the other Member States of the European Union have published studies in order to identify the chemicals used in textiles² potentially responsible for allergy cases.

These cases can be attributed to causes involving multiple factors:

- Many chemicals are used in the manufacture of textile articles and footwear.
- Many chemicals are used during the life cycle of textile articles and footwear, particularly during shipment and for their preservation and maintenance.
- When used by the consumer, many other factors can be involved (mechanical, physical, co-exposure to various other products).

The issue of textile clothing is also being addressed in the framework of the Working Group on Chemicals coordinated by ANSES in conjunction with the French Toxicovigilance Coordination Committee.

1.2 Purpose of the request

ANSES's expert appraisal was requested with the following aims:

- To identify any skin irritant or sensitising chemicals liable to be found in footwear and textile articles. If other relevant chemicals are identified, other than skin irritant or sensitising substances, they will also be included in the review of knowledge;
- To conduct a review of knowledge on the risks presented by the substances identified in the previous step:
 - ✓ a review of the existing literature in the field of human toxicology in order to identify the relevant routes of exposure and any existing toxicity reference values relevant to consumer exposure,
 - ✓ a review with the aim of assessing the prevalence of allergic phenomena attributed to the presence of these substances.

¹ DGCCRF surveys

² Chemicals in Textiles – Risks to human health and the environment. KEMI, 2014

Study on the **link** between allergic reactions and chemicals in textile products. RPS, 2013

Hazardous substances in textile products. RIVM, 2014

- To make recommendations regarding manufacture and, if applicable, preservation during shipment, by considering the point of view of the final consumer;
- To issue an opinion on the advisability of limiting the use of some of the substances identified;
- To propose a methodology for investigating cases of skin allergy or intolerance reported by specialist physicians, in order to gain further knowledge about the substances in question.

1.3 Procedure: means implemented and organisation

ANSES entrusted examination of this request to the Expert Committee (CES) on "Assessment of chemical risks of consumer items and products".

The methodological and scientific aspects of the rapporteurs' expert appraisal work were regularly submitted to the CES. The report issued by the rapporteurs takes into account the comments and additional information provided by the members of the CES.

This work was therefore conducted by a group of experts with complementary skills.

The expert appraisal was carried out in accordance with French Standard NF X 50-110 "Quality in Expert Appraisals – General Requirements of Competence for Expert Appraisals (May 2003)".

1.4 Prevention of risks of conflicts of interest

ANSES analyses interests declared by experts before they are appointed and throughout their work in order to prevent risks of conflicts of interest in relation to the points addressed in expert appraisals.

The experts' declarations of interests are made public via the ANSES website (www.anses.fr).

2 Applicable European regulations

2.1 Footwear

French Decree No. 96-477 of 30 May 1996 on the labelling of materials used in the main components of footwear offered for sale to consumers, explains the requirements relating to this labelling.

This Decree also gives a definition for the concept of footwear, which served as the basis for this formal request. Footwear means any product with a sole intended to protect or cover the foot, including parts of shoes marketed separately (examples: sandals, boots, sports shoes, ski boots, ballet shoes, slippers, baby booties, etc.).

This Decree excludes safety shoes, second-hand shoes and shoes considered to be toys.

2.2 Textile clothing articles

Regulation (EU) No 1007/2011 of the European Parliament and of the Council of 27 September 2011 concerns textile fibre names and related labelling and marking of the fibre composition of textile products. This Regulation repeals Directives 73/44/EC, 96/73/EC and 2008/121/EC.

This Regulation aims to ensure the provision of accurate information to European consumers and improve the functioning of the clothing and textile markets in the EU.

To this end, it lays down rules concerning the use of textile fibre names and related labelling and marking of fibre composition of textile products. This Regulation also establishes rules concerning the labelling or marking of textile products containing non-textile parts of animal origin and rules concerning the determination of the fibre composition of textile products by quantitative analysis of binary and ternary textile fibre mixtures, with a view to improving the functioning of the internal market and providing accurate information to consumers.

It also establishes the analytical methods for verifying the information shown on the labels or markings.

Products with at least 80% of their weight in fibres are considered as having to comply with the Regulation.

This Regulation lists all the fibres concerned.

2.3 Leather clothing and goods

French Decree No. 2010-29 of 08/01/2010 repealed the Decree of 18/02/1986 concerning application of the Act of 1 August 1905 to trade in leather and imitation leather goods. A new regulatory architecture has also been adopted, since the Decree gives the main definitions and refers to the Ministerial Order of 8 February 2010 regarding the definitions of the raw materials and types of finish.

According to the Decree:

- Leather is considered to be the product obtained from the animal skin through tanning or impregnation, retaining the natural structure of the skin's fibre and all or part of its grain;

- Split leather is considered to be the internal part of the leather, obtained by dividing the leather across its thickness into layers, or any other operation resulting in the complete removal of the external layer, and on which all the attachment points of the hairs, feathers or scales are destroyed. In the case of pig split leather, the attachment of the hair follicles may remain visible.

New rules have thus been introduced, mainly in terms of labelling to improve the information provided to the consumer and the fairness of commercial practices.

2.4 Regulations relating to the substances

Annex XVII of Regulation (EC) No 1907/2006 (the REACH Regulation) imposes certain restrictions on hazardous substances in articles sold to the public and particularly textile products and/or footwear:

Table 1: Restrictions on hazardous substances (Annex XVII of Regulation (EC) No 1907/2006)

Entry	Substance	Concentration limits/restriction on use	Comment
Entry 4	Phosphate de tri (2,3 dibromopropyle)	Ne doit pas être utilisé	
Entry 7	Oxyde de triaziridinylphosphine	Ne doit pas être utilisé	
Entry 8	Polybromobiphényle (PBB)	Ne doit pas être utilisé	Ne doit pas être utilisé dans les articles textiles tels que les vêtements, sous-vêtements, linge de lit, pouvant entrer en contact avec la peau.
Entry 20	Composés organiques de l'étain tri-substitués (tributyl et triphenylétain) Dibutylétain Dioctylétain	0,1% _w d'étain 0,1% _w d'étain 0,1% _w d'étain	Tout type d'article ou mélange
Entry 23	Cadmium and its compounds	0,01% _w du matériau plastique	Ne peut être utilisé dans les mélanges ou articles issus des polymères synthétiques
Entry 24	Mono-méthyl-tétrachlorodiphénylméthane	Ne doit pas être utilisé	Tout type d'article ou mélange
Entry 25	Mono-méthyl-dichlorodiphénylméthane	Ne doit pas être utilisé	Tout type d'article ou mélange
Entry 26	Mono-méthyl-dibromodiphénylméthane bromobenzylbromotoluène, mélange d'isomères	Ne doit pas être utilisé	Tout type d'article ou mélange
Entry 27	Nickel et ses dérivés	Libération de Ni < 0.5µg/cm ² /week	Articles métalliques (boutons, boucles, rivets etc) en contact direct et prolongé avec la peau
Entry 43	Colorants azoïques	0,003% _w (exprimés en amines aromatiques)	Les colorants azoïques pouvant libérer, par coupure réductrice d'un ou de plusieurs groupements azoïques, une ou plusieurs des amines aromatiques énumérées dans l'appendice 8, en concentrations détectables, c'est-à-dire supérieures à 30 mg/kg (0,003 % en poids) dans les articles finis ou dans les parties teintes de ceux-ci, selon les méthodes d'essai énumérées dans l'appendice 10, ne peuvent être utilisés dans les articles en tissu et en cuir susceptibles d'entrer en

			<p>contact direct et prolongé avec la peau humaine ou la cavité buccale, tels que :</p> <ul style="list-style-type: none"> — vêtements, literie, serviettes de toilette, postiches, perruques, chapeaux, couches et autres articles d'hygiène, sacs de couchage, — chaussures, gants, bracelets de montre, sacs à main, porte-monnaie/portefeuilles, porte-documents, dessus de chaises, porte-monnaie portés autour du cou, — jouets en tissu ou en cuir et jouets comportant des accessoires en tissu ou en leather, — fil et étoffes destinés au consommateur final. <p>2 En outre, les articles en tissu ou en cuir visés au paragraphe 1 ne peuvent être mis sur le marché que s'ils sont conformes aux exigences qui y sont énoncées.</p> <p>3 Les colorants azoïques énumérés sur la «liste des colorants azoïques» figurant à l'appendice 9 ne peuvent être mis sur le marché, ni utilisés en tant que substances ou dans des mélanges à des concentrations supérieures à 0,1 % en poids, si les substances ou les mélanges sont destinés à être utilisés pour teindre des articles en tissu ou en cuir</p>
Entry 45	Diphényléther, dérivé octabromé	0.1% _w	
Entry 46	Nonylphénol et nonylphénol éthoxylés	0.1% _w	Pour traitement des textiles ou du cuir sauf s'il n'y a pas de rejet dans les eaux usées
Entry 47	Composés du Chrome VI	0,0003% _w (3mg/kg)	Articles en cuir (environ 90 % du cuir dans le monde est tanné aux sels de Cr(III), qui peuvent être métabolisés en Cr(VI) sous certaines conditions)
Entry 50	Hydrocarbures polycycliques aromatiques	0,0001% _w (1mg/kg)	Pour tout article avec une partie plastique ou caoutchouc qui entre contact prolongé ou de façon répété avec la peau.
Entry 61	Fumarate de diméthyle	0.1 mg/kg	Tout type d'article
Entry 63	Plomb et ses dérivés	Pb accessible 0,05% _w et si possibilité de mise en bouche par les enfants	

Annex XIV of Regulation (EC) No 1907/2006 (the REACH Regulation) imposes bans on using hazardous substances in articles sold to the public and particularly textile products and/or footwear:

Table 2: Bans on hazardous substances (Annex XIV of Regulation (EC) No 1907/2006)

Entry	Substance – CAS No.	Uses exempted from prohibition
5	Phtalate de benzyle et de butyle - 85-68-7	Utilisations dans les conditionnements primaires des médicaments couverts par le règlement (CE) n° 726/2004, la directive 2001/82/CE et/ou la directive 2001/83/CE
4	Phtalate de bis(2-éthylhexyle - 117-81-7	
6	Dibutyl phthalate - 84-74-2	
7	Diisobutyl phthalate - 84-69-5	-
23	Formaldehyde, oligomeric reaction products with aniline - 25214-70-4	-

The Substances of Very High Concern (SVHC) are included on ECHA's candidate list for authorisation. For these substances, there is no ban/restriction on use apart from a requirement for professionals to notify and transmit information to ECHA for any article containing one of the substances on the candidate list at a concentration of more than 0.1%.

2.5 Biocides Regulation (EU) No 528/2012

Biocides can be applied to textiles for a specific purpose, for example an antibacterial function. The "Biocides" Regulation requires an authorisation, including a risk assessment indicating safe use and control of potential risks for the consumer. According to the Biocides Regulation, a treated article is any substance, mixture or article which has been treated with, or intentionally incorporates, one or more biocidal products.

2.6 Persistent Organic Pollutants Regulation (EC) No 850/2004

The term Persistent Organic Pollutant (POP) covers a group of organic substances with four properties. They are:

- persistent: the substance degrades "slowly",
- bioaccumulative: the substance "accumulates" within living beings,
- toxic: exposure to the substance is likely to cause harmful effects,
- mobile over long distances: high concentrations can be measured far from the discharge points (in the Arctic, for example).

The aim of the POP Regulation is to protect human health and the environment by prohibiting or restricting the production or introduction on the market of these substances. Certain substances regulated by the POP Regulation may be found as contaminants in the production of textiles (insecticides, hexachlorobenzene, PCBs, dioxins, dichlorodiphenyltrichloroethane (DDT), hexabromocyclododecane, polycyclic aromatic hydrocarbons (PAHs), polybrominated diphenyl ethers, perfluorooctanesulfonic acid (PFOS) and derivatives).

2.7 Labelling schemes

There are several voluntary initiatives in the form of different labelling schemes. These textile labels are guides for consumers and industry.

In the textile field, there are several ecolabels, which involve certification of industrial companies that meet these labels' criteria: Global Organic Textile Standard (GOTS), Nordic Eco-Label, EU Ecolabel, Oeko-Tex, Blue Sign.

2.7.1 European ecolabel for textiles and footwear

Decisions No 2009/567/EC and No 2009/563/EC specify the criteria for the award of the European ecolabel for textile products and footwear.

The aims of the criteria for textile products:

- to promote the reduction of water pollution related to the key processes throughout the textile manufacturing chain, including fibre production, spinning, weaving, knitting, bleaching, dyeing and finishing.

The aims of the criteria for footwear:

- to limit the levels of toxic residues³,
- to limit the emissions of volatile organic compounds⁴,
- to promote a more durable product.

2.7.2 Oeko-Tex

Oeko-Tex is an international association for research and testing in the field of textile and leather ecology. According to the Oeko-Tex website, *the Standard 100 by OEKO-TEX® is a worldwide consistent, independent testing and certification system for raw, semi-finished, and finished textile products at all processing levels, as well as accessory materials used. This label is widely used in Europe and Japan.*

³ Arsenic, chromium VI, lead, cadmium, formaldehyde, pentachlorophenol (PCP) and tetrachlorophenol (TCP). No azo dyes shall be used that may cleave to any of the following aromatic amines: 4-aminodiphenyl (92-67-1); benzidine (92-87-5); 4-chloro-o-toluidine (95-69-2); 2-naphthylamine (91-59-8); o-aminoazotoluene (97-56-3); 2-amino-4-nitrotoluene (99-55-8); p-chloroaniline (106-47-8); 2,4-diaminoanisole (615-05-4); 4,4'-diaminodiphenylmethane (101-77-9); 3,3'-dichlorobenzidine (91-94-1). The following N-nitrosamines shall not be detected in rubber: N-nitrosodimethylamine, N-nitrosodiethylamine, N-nitrosodipropylamine, N-nitrosodibutylamine, N-nitrosopiperidine, N-nitrosopyrrolidine, N-nitrosomorpholine, N-nitroso-N-methyl-N-phenylamine, N-nitroso-N-ethyl-N-phenylamine, chloralkanes, alkylphenols, perfluorooctane sulfonates, dyes meeting the criteria for classification as sensitising to skin, phthalates, biocides.

⁴ VOCs are any organic compound having at 293.15 K a vapour pressure of 0.01 kPa or more, or having a corresponding volatility under the particular conditions of use. The total use of VOCs during final footwear production shall not exceed, on average, 20 gram VOC/pair.

The central focus of the Standard 100 by OEKO-TEX® has been the development of test criteria, limit values and test methods on a scientific basis. The Standard 100 by OEKO-TEX® takes account of:

- Important legal regulations, such as banned azo colourants, formaldehyde, pentachlorophenol, cadmium, nickel, etc.
- Numerous harmful chemicals, even if they are not yet legally regulated.
- Requirements of Annexes XVII and XIV of the European Chemicals Regulation REACH, as well as the ECHA-SVHC Candidate List insofar as they are assessed by expert groups of the OEKO-TEX® association to be relevant for fabrics, textiles, garments or accessories. Discussions and developments that are considered to be relevant are taken into account as quickly and effectively as possible through updates to the Standard 100 by OEKO-TEX®.
- Requirements from the US Consumer Product Safety Improvement Act (CPSIA) regarding lead.
- Numerous also environmentally relevant substance classes.

2.7.3 Bluesign

Bluesign is an international label for textiles founded in Switzerland in 2000. It indicates that no harmful substance has been used in the production process and includes binding criteria for energy and water consumption.

The label is managed by Bluesign Technologies, which also performs the assessment. Bluesign Technologies is a private international organisation made up of representatives from the textile sector who wish to reduce the social and environmental impact of textiles.

It has lists of chemical substances that must not be used during the process or in the finished articles⁵. The environment, health and safety are taken into account in this label.

2.7.4 Joint Roadmap (ZDHC)

Several leaders of the global textile market joined forces in 2011, in order to compile a list of substances (Zero Discharge of Hazardous Chemicals) that may not be released from their production lines after 2020. These lists mainly include substances with CMR, PBT, vPvB or endocrine-disrupting properties.

The substances or groups of substances on this list include:

- Alkylphenols or alkylphenol ethoxylates,
- Chlorobenzenes, chlorotoluenes,
- Chlorophenols,
- Dyes (azo or disperse),

⁵ <https://www.bluesign.com/industry/infocenter/downloads>

- Flame retardants,
- Glycols,
- Halogenated solvents,
- Organotin compounds,
- PAHs,
- Perfluorinated or polyfluorinated chemicals,
- Phthalates,
- Heavy metals,
- Volatile organic compounds.

2.7.5 Nordic Ecolabel

The Nordic Ecolabel was created in 1989⁶ and is promoted by all the Nordic countries (Denmark, Finland, Sweden, Norway and Iceland). It is a voluntary tool for consumers, designed to guide them in the choice of products that are more environmentally friendly. The substances that should not be used are described in the document "Nordic Ecolabelling of Textiles, hides/skins and leather"⁷.

2.7.6 Global Organic Textile Standard

The Global Organic Textile Standard is a standard for textiles made from organic fibres. GOTS is a private international working group comprising organisations such as OTA (USA), IVN (Germany), the Soil Association (UK) and JOCA (Japan). This label's website *defines high-level environmental criteria along the entire organic textiles supply chain and requires compliance with social criteria as well. Only textile products that contain a minimum of 70% organic fibres can become GOTS certified.* In particular, the GOTS standard prohibits the presence of:

- *aromatic and/or halogenated solvents,*
- *formaldehyde and all substances that contain or generate formaldehyde or other short-chain aldehydes,*
- *brominated and chlorinated flame retardants,*
- *chlorophenols,*
- *endocrine disruptors,*
- *heavy metals (exceptions are made for dyes and pigments),*
- *organotins,*
- *PAHs,*
- *plasticisers,*

⁶ This ecolabel was established in 1989 by the Nordic Council of Ministers.

⁷ <http://www.nordic-ecolabel.org/criteria/product-groups/?p=3>

- *substances releasing carcinogenic arylamine compounds,*
- *substances containing functional nanoparticles (with a size < 100 nm).*

2.8 Standards

The ISO/TR 16178:2012 standard establishes a list of critical chemical substances potentially present in footwear and footwear components. This standard describes the critical chemical substances, their potential risks, the materials in which they can be found, and the test methods that can be used to quantify them.

The FD CEN/TR 16741 standard establishes environmental and health recommendations applicable to textile products in direct contact with the skin and found in the vicinity of the human body. This standard describes the chemical substances designed for use in textile products intended for clothing, interior textiles and upholstery, their potential risks, the materials in which they can be found, and the test methods that can be used to quantify them.

2.9 European initiatives in progress

2.9.1 CMR restriction in textiles

Article 68(2) of the REACH Regulation allows a simplified procedure for restricting substances classified as carcinogenic, mutagenic or toxic for reproduction (CMR), Category 1A or 1B, that could be used by consumers.

The European Commission therefore decided to use this article to restrict CMR substances found in textiles.

An initial list of CMR substances has been chosen by the European Commission to be covered by the restriction and therefore added to Annex XVII of the REACH Regulation.

Two hundred and ninety-one substances would potentially be affected by the restrictions (maximum thresholds).

After analysing the comments received from various organisations and bodies (industrial companies, analysis laboratories, Member States, etc.) including ANSES (Annex 3) following the public consultation on the proposed restriction, the Commission decided to:

- limit the scope of the restriction to articles in direct contact with the skin.
- include the substances used in the composition of these articles and having the highest probability of direct contact with the skin.

The articles concerned are clothing, footwear, interior textiles (for example bed linen), and any textile that could be in direct and prolonged contact with the skin. Accessories such as buttons, zips, interior textiles with infrequent contact with the skin, and footwear made of real leather are excluded.

The substances concerned by the restriction are:

- Formaldehyde (CAS No. 50-00-0).
- PAHs,

- Azo dyes,
- Phthalates,
- Aprotic solvents (DMAC, NMP and DMF),
- Heavy metals.

2.9.2 Sensitising substances in textiles: The KEMI's Risk Management Option Analysis

In the framework of the REACH Regulation, the Swedish Chemicals Agency (KEMI) drafted a document entitled "Risk Management Option Analysis (Best-RMOA)", relating to skin sensitising substances in textile articles.

A "Best RMOA" can be drafted by Member States when they consider that a substance (or a group of substances) warrants particular attention, in order to determine whether there are grounds for initiating regulatory management measures (under REACH or sectoral regulations) for this substance.

In the present case, the KEMI studied sensitising substances in textiles. Even though the RMOA mentions formaldehyde-based resins and azo dyes as known skin sensitisers and irritants, reference is also made to other allergens found in textiles, such as dyes (basic, direct, etc.), softeners, fragrances and biocides.

The RMOA also provides a summarised focus on the frequencies of allergic contact dermatitis from textiles in Europe.

The RMOA concluded that a restriction of sensitising substances classified as Skin Sens. 1/1A/1B in textile articles in direct contact with the skin (clothing, towels, bed linen and some interior textiles, footwear) would be the best option for managing the risk associated with these substances. The KEMI would exclude articles made of leather, fur or feather from the scope of the restriction.

ANSES joined forces with the KEMI to be able to submit the restriction dossier to the European Chemicals Agency (ECHA).

2.10 The specific applicable regulations

No specific French regulations are applicable besides the regulations cited above.

In addition to the European regulations, the Netherlands have adopted two specific restrictions on the use/presence of formaldehyde and pentachlorophenol in textiles.

Formaldehyde is limited to a maximum concentration of 120 ppm in clothing after the first wash. Pentachlorophenol in commercial products, including textiles, is restricted to a maximum concentration of 5 mg/kg (Dutch Legislation – Warenwet October 2014).

Denmark has a specific regulation concerning three heavy metals: lead, mercury and cadmium. These Regulations, described in Executive Orders Nos. 856 (2009), 858 (2009) and 627 (2003), imply that the import, sale or export of products, including textiles, containing these three metals (in

their metal form or in the form of compounds) at concentrations higher than those mentioned below is prohibited:

- Lead: 100 mg/kg (0.01%);
- Cadmium: 75 mg/kg (0.0075%);
- Mercury: 100 mg/kg (0.01%);

In the United States, textiles are regulated from the point of view of chemical and environmental safety by several texts. The government agencies responsible for these regulations are the Occupational Safety & Health Administration (OSHA) and the Environmental Protection Agency (EPA). OSHA works in the area of chemical products and human health, while the EPA is responsible for emissions of chemicals in the environment during textile manufacture.

The US EPA regulates the textile manufacturing sector through its document NAICS 313.

In China, several standards are used in connection with textiles via the National General Safety Technical Code for Textile Products (GB 18401-2010). This standard divides textile products into three categories: products for children, products in contact with the skin, and products not in contact with the skin. Maximum thresholds are laid down in this technical code for formaldehyde, the pH of textile materials, etc. Dyes producing any of the 24 aromatic amines⁸ (indicated in the footnote here) are prohibited in all three categories of products.

⁸ aminobiphenyl (92-67-1), benzidine (92-87-5), 4-chloro-o-toluidine (95-69-2), 2-naphthylamine (91-59-8), o-aminoazotoluene (97-56-3), 5-nitro-o-toluidine (99-55-8), 4-chloroaniline (106-47-8), 4-methoxy-m-phenylene diamine (615-05-4), 4,4'-diaminobiphenylmethane (101-77-9), 3,3'-dichlorobenzidine (91-94-1), o-dianisidine (119-90-4), 3,3'-dimethylbenzidine (119-93-7), 4,4'-dimethylene di-o-toluidine (838-88-0), p-cresidine (120-71-8), 4,4'-methylene-bis-(2-chloro-aniline) (101-14-4), 4,4'-oxydianiline (101-80-4), 4,4'-thiodianiline (139-65-1), o-toluidine (95-53-4), 4-methyl-m-phenylene diamine (95-80-7), 2,4,5-trimethylaniline (137-17-7), o-anisidine (90-04-0), 4-aminoazobenzene (60-09-3), 2,4-xylidine (95-68-1), 2,6-xylidine (87-62-7).

3 Literature data on the frequency of contact dermatitis

A review of studies exploring contact dermatitis caused by textile clothing or footwear was carried out between 2000 and 2016. This analysis helped establish a link between the occurrence of dermatitis and a substance or group of substances found in the article in question. No studies have assessed the prevalence of contact dermatitis induced by these articles in the general population, however. Only the positivity rate for tests in the populations investigated has been considered in this section.

French data from the Dermato-Allergology Study and Research Group (GERDA) indicate positivity prevalences in patch tests for textile clothing ranging between 1 and 5%. For shoes, the prevalence in the patients investigated by the dermatology centres was between 3 and 11% (Bourrain, 2016).

3.1 Contact dermatitis induced by textiles

The study by Lisi *et al.* (2014) investigated 277 patients for suspected contact dermatitis from textile clothing. The patch tests performed included 22 allergens including disperse dyes⁹, basic dyes, aromatic amines, formaldehyde resins and thiuram mix, as well as other substances such as DMFu, a chloromethylisothiazolinone/methylisothiazolinone mixture and 2-mercaptobenzothiazole (MBT). The results showed that 154 patients were sensitised to at least one allergen from the battery used. Disperse and basic dyes accounted for 81.8% of positive reactions. Textile dyes were suspected of being responsible for the skin problems observed in 46.3% of patients. The other agents responsible were formaldehyde resins used as textile sizes, with a frequency of 2.3%. This study showed a high frequency of positive patch tests for textile dyes in the cases of suspected contact dermatitis from a textile.

A review assessed the positivity rate in patch tests with the following disperse dyes: Disperse Blue 35, 106, 124; Disperse Yellow 3, 37; Disperse Red 1, 17; Disperse Orange 3; Disperse Black 1 (Malinauskiene *et al.*, 2013). The results showed that the rate varied between 0.4% and 4.7% according to the studies and the type of dye tested. A study conducted in children showed that the rate was 4.6% (Giusti *et al.*, 2003). According to the authors, the disperse dyes generally implicated in contact dermatitis did not seem to be found in the textile articles analysed. It seems important to adapt the commercial allergens based on substances currently used in the textile industry (Malinauskiene *et al.*, 2013).

A review assessed a mixture of eight disperse dyes known as the "Textile Dye Mix" (TDM), included in a standard European battery to detect allergies to disperse dyes during routine exploration in patients ranging from 8 to 94 years old (Isaksson *et al.*, 2015; Ryberg *et al.*, 2011-2014-2015). The TDM is made up of the following eight dyes: Disperse Orange 1, 3; Disperse Red 1, 17; Disperse

⁹ Disperse dye: substance of low molecular weight, with an azo, anthraquinone or diphenylamine structure, used to dye synthetic fibres such as polyester (Mahapatra, 2016).

Yellow 3; Disperse Blue 35, 106, 124. Many of the cross-reactions were observed between Disperse Orange 3 and 1,4-paraphenylenediamine. The clinical relevance was considered uncertain in more than 30% of the positive cases (Isaksson *et al.*, 2015).

The results showed a positivity rate for the TDM test of between 2.5% and 3.7%. This review was able to document this test's limitations such as the red colouration of the skin after application, which makes reading of the test difficult, the risk of sensitisation from allergens contained in the TDM in patients tested and not previously sensitised, and the cross-reactions between the TDM and paraphenylenediamine due to the presence of Disperse Orange 3 (Isaksson *et al.*, 2015).

Outside Europe

Lastly, outside Europe, a clinical study in Australia was conducted in 2069 patients in whom allergic contact dermatitis from clothing was strongly suspected. The authors showed that 157 patients (7.6%) responded to at least one allergen from a "textiles" battery. The most frequently implicated allergen was Basic Red 46, accounting for 20.6% of positive reactions. It was most often found in dark-coloured acrylic socks for men. The next most frequently implicated allergens were Disperse Blue 124 and Disperse Blue 106. Formaldehyde and the formaldehyde releasers tested were responsible for more than 30% of positive reactions (Slodownik *et al.*, 2011).

3.2 Contact dermatitis induced by footwear

The frequency of contact dermatitis caused by allergens found in shoes was around 1.5 to 24.2% in patients subjected to patch tests (Matthys *et al.*, 2014; Giménez-Arnau, 2016). This variability is mainly due to perspiration, which can promote the release of allergens, as well as to seasonality and footwear manufacturing processes.

One of the most frequently identified allergens was potassium dichromate (a chromium VI compound). In a retrospective study in Sweden over a period of 10 years, involving 6494 patients with an average age of 48 years presenting with allergic contact dermatitis, chromium was found with a positivity rate of around 3.6% (Lejding *et al.*, 2016).

Studies have shown high levels of sensitisation to cobalt, whose salts are used as metal dyes, in the dyeing of leather and as catalysts for certain glues (INERIS, 2003). Leather is the main source of exposure to cobalt (Hamann *et al.*, 2014). Cobalt allergy is often associated with chromium-induced contact dermatitis (Geier *et al.*, 2000).

Rubber additives, such as thiurams, dithiocarbamates and/or mercaptobenzothiazoles and thioureas, can cause contact dermatitis. Some studies have reported positive tests for diphenylthiourea, found in synthetic rubber and plastics due to its use as a stabiliser in the manufacture of PVC and as an accelerator in the production of neoprene (Samuelsson *et al.*, 2011). Reactions between these additives during vulcanisation can generate new compounds such as dimethylthiocarbamylbenzothiazole sulfide (DMTBS). Patch testing for DMTBS proved positive in Belgian and Dutch patients, induced by flexible canvas tennis shoes (Schuttelaar *et al.*, 2014).

The para-tert-butylphenol-formaldehyde (PTBPF) resin used as an additive in rubber adhesives is found in neoprene suits and sport equipment such as shin pads. The patch tests that were positive for this substance in both adults and children demonstrated its ubiquitous use (Herro and Jacob, 2012). The role of 2-monomethylol phenol or 2-(hydroxymethyl)phenol, resulting from the condensation of the PTBPF resin in the shin pads, remains unexplained. A rare case of contact sensitivity was found with this compound (Ali *et al.*, 2009).

Nardelli *et al.* (2005) conducted a retrospective study in Belgium in 1168 patients suspected of footwear-induced contact dermatitis. The allergens detected were potassium dichromate and cobalt chloride (concomitant to the chromium), p-phenylene diamine, rosin and PTBPF resin. The 2-(thiocyanomethylthio)-benzothiazole (TCMTB) included in the tested allergens was revealed to be one of the 10 most frequent allergens. Individuals sensitised to MBT derivatives also reacted to this compound.

Hunasehally *et al.* (2010) conducted a retrospective study to investigate the correlation between the specific site of foot dermatitis and the allergens responsible. The most commonly found allergens were PTBPF resin (19%), chromium VI salts (19%), MBT (18%) and rosin (16%). Four patients were positive to their own shoe alone with no other causative allergen identified. Among the patients, the most frequently affected anatomical sites were the top of the foot (37%) and the sole (32%). The only prediction possible was that 72% of patients with contact dermatitis affecting the sole were allergic to rubber accelerators.

Outside Europe

Lazzarini *et al.* (2004) showed that 70% of Brazilian patients investigated for suspected contact dermatitis of the foot reacted to rubber and metal allergens.

In a retrospective study conducted in Argentina, PTBPF resin was most commonly detected, followed by metals (potassium dichromate and nickel) and rubber additives (thiurams and MBT) (Cannavo, 2010).

In a study conducted in Israel, 24 out of 58 patients suspected of footwear-induced contact dermatitis had positive patch tests for chromium (27%), nickel (12%), the CMIT/MIT mixture (11%) and PTBPF resin (9%) (Trattner *et al.*, 2003).

In a retrospective study by Warshaw *et al.* (2007) in North America, tests were most often positive for PTBPF resin, potassium dichromate, thiurams, rosin, MBT, thioureas, p-phenylene diamine and black rubber mix.

The prospective study by Febriana *et al.* (2015) in Indonesia indicated that 32 patients (66.7%) had a positive reaction to 2-mercaptobenzothiazole and 1,3-diphenylguanidine, followed by 4,4'-dithiodimorpholine, N-isopropyl-N'-o-phenyl-p-phenylene diamine and hydroquinone monobenzyl ether.

4 Study of cases of exposure to textiles and footwear recorded by the French poison control centres

In 2008, dimethyl fumarate (DMFu) was recognised as responsible for allergic and irritative contact dermatitis in several countries of the European Union. In France, three successive studies, in 2009, 2011 and then 2013, reviewed the cases recorded by the poison control centres (CAPs) and the dermato-allergology vigilance network (Revidal-GERDA). Following the restriction of DMFu in May 2012 under the REACh Regulation, which prohibited its use and placing on the market in articles at concentrations above 0.1 mg/kg, a weekly extraction of cases was performed to enable the CAPs to monitor symptomatic cases. The French Health & Safety Agency (ANSES) decided it needed a new retrospective study of cases recorded by the CAPs in 2015.

An extraction of the cases recorded between 1 January and 31 December 2015 was carried out based on the following agents from the national database on products and compositions (BNPC): dimethylfumarate, DMFu, clothing, footwear and sport articles. The CAPs each reviewed their dossiers and followed up the poisoned individuals. In total, 25 cases corresponded to exposure to textiles or footwear responsible for a skin manifestation, with a predominance in women. For 20 cases, the agents in question were footwear, most often purchased from public retailers. All the cases were symptomatic, with localised skin manifestations (erythema, pruritus, localised oedema) and always a favourable outcome once identified. Accountability was determined with regard to the article (shoes or clothing) and the substance (DMFu or another irritant/allergen). Accountability of the article was unlikely in three cases, possible in 21 and likely in one. Accountability of the substance on the other hand could not be determined in most cases.

An analysis of the article was only performed on three occasions indicating the absence of DMFu and in one case the presence of isopropylaniline. However, the list of chemical substances screened for is unknown. In parallel, patch tests were only performed on four patients, as most abandoned after they had recovered. The tests in a patient without any prior history of allergies proved positive for DMFu. In a patient known to be allergic to DMFu, the tests were also positive for chromium, nickel and PTBPF resin. Again, the substances screened for were not precisely indicated in the dossiers.

Even though the number of cases reported to the CAPs has decreased over the years, this compilation shows the persistence of cases of skin allergies or irritation resulting from the wearing of textile articles or footwear. It was not possible to confirm the accountability of any given substance because of the lack of analyses on the articles, despite their importance. Moreover, patch tests were rarely carried out by the patients because their lesions had healed, but also because of the costs and the limitations of these tests when performed by general practitioners conducting dermatology-

allergy examinations. However, in this compilation, it seems possible that the symptoms, chronology and topography of the lesions could be related to the article worn in each case, but without a particular substance being implicated in their occurrence. Patient care could be improved by better cooperation between the CAPs and Revidal-GERDA, coupled with an analysis of the suspected article in the framework of a prospective study, improving knowledge on allergenic and irritating chemical substances contained in textile articles and footwear.

5 Literature data for identification of the substances found in textile clothing and footwear

5.1 Identification of substances at European level

An analysis of the various reports published by European agencies was carried out to identify the potentially skin sensitising or irritant substances in textile clothing and footwear.

5.1.1 Rapports du Kemi (Swedish Chemicals Agency)

5.1.1.1 "Hazardous chemicals in textiles" (2013)

Cette étude¹⁰ avait pour objectif d'identifier les substances dangereuses (CMR 1A/1B, substances sensibilisantes cutanées et/ou respiratoires 1A/1B, les perturbateurs endocriniens) utilisées dans la production de textiles et quelles substances chimiques dangereuses pouvaient être trouvées dans le produit textile fini (hors produits biocides). Une liste non exhaustive de substances dangereuses a été créée qui, selon le KEMI, devraient être réglementées dans le cadre de leur utilisation dans des textiles (par exemple : amines, formaldéhyde, alcane, organo-étains, composés du chrome, etc..).

Le KEMI proposait d'amender le règlement 1007/2011 notamment en tenant compte des propriétés intrinsèques des substances chimiques utilisées dans les textiles en se fondant sur la classification harmonisée des substances et en proposant des concentrations limites d'utilisation. Les 3 axes d'amélioration suggérés, en partant de substances ayant une classification harmonisée, sont :

- Restriction sans concentration limite pour les substances CMR 1A/1B (H340, H350, H360) ou pour les substances ayant une classification harmonisée Toxicité aquatique chronique 1 (H410) et pour les substances étant sur la liste candidate.
- Restriction avec concentration limite pour les substances présentes dans les textiles et ayant comme classification harmonisée sensibilisation cutanée et/ou respiratoire (H334, H317) (notamment en lien avec l'article 2.2(b) du règlement 1007/2011)
- Procédure pour inclure une substance (ou un groupe de substances) en abaissant sa concentration au maximum, notamment pour les substances PE, SVHC, CMR 2, auto-classées.

5.1.1.2 "Chemicals in Textiles – Risks to human health and the environment"(2014)

L'objectif de cette étude¹¹ était d'identifier les substances chimiques dangereuses présentes dans les articles textiles (vêtements et textiles ménagers – hors textiles techniques) et celles qui présentent un risque pour la santé humaine et l'environnement.

Cette étude n'a pas pris en compte les substances utilisées lors des procédés de fabrication des articles textiles ni les substances utilisées comme intermédiaires. De même, les substances

¹⁰ <http://www3.kemi.se/Documents/Publikationer/Trycksaker/Rapporter/Rapport-3-13-textiles.pdf>

¹¹ <https://www.kemi.se/files/8040fb7a4f2547b7bad522c399c0b649/report6-14-chemicals-in-textiles.pdf>

présentes dans les articles tels que les boutons, zips ou autres détails, ne sont pas incluses dans cette étude.

Pour établir la liste de substances, le KEMI a réalisé une étude bibliographique, puis a mis en place une méthode de priorisation en utilisant notamment les données de classification harmonisée (et auto-classification), la probabilité de trouver cette substance dans le produit fini, sa probabilité de relargage dans l'environnement... Ainsi, la liste de substances établie comprend principalement des retardateurs de flammes, des plastifiants, des colorants azoïques, des fragrances. L'étude indique également que les substances CMR et allergènes devraient être interdites dans les articles en contact direct et prolongé avec la peau¹². D'autre part, l'étude a conclu que les colorants textiles et les résines de finitions textiles pouvaient induire des réactions allergiques cutanées. Cependant, il est également indiqué que les concentrations des substances irritantes et sensibilisantes cutanées présentes ou restantes dans les textiles sont souvent des données manquantes, d'où la difficulté à faire le lien entre substances dangereuses présentes et dermatites de contact.

5.1.1.3 "Hazardous chemical substances in textiles" (2016)

Ce rapport¹³ (KEMI, 2016) présente plusieurs mesures potentielles qui pourraient être mises en place afin de diminuer les risques liés à la présence de substances chimiques dangereuses dans les textiles. Les différentes mesures présentées dans ce rapport sont :

- La mise en place d'une législation spécifique concernant les textiles en Europe qui imposerait des requis nécessaires concernant les substances chimiques présentes dans les textiles. Cette législation devrait couvrir les substances CMR, perturbatrices endocriniennes, allergisantes et dangereuses pour l'environnement.
- Soutenir la possibilité d'introduire des restrictions supplémentaires concernant les colorants azoïques non couverts actuellement par la législation européenne.
- La mise en place d'une étude sur la possibilité d'établir une taxe sur les textiles d'habillement et les textiles d'intérieur.

5.1.2 Rapport du Joint Research Centre

En 2007, la Commission européenne a mené une étude¹⁴ « European survey on the release of formaldehyde from textiles ». Cette étude avait pour objectifs de :

- Réaliser une étude des niveaux de formaldéhyde « relarguable » présents dans les textiles manufacturés vendus sur le marché européen quel que soit le pays de fabrication ;
- Evaluer l'exposition par voie cutanée pour les enfants et les adultes.

¹² La définition d'un « contact prolongé et direct avec la peau » n'est pas explicitée dans le rapport.

¹³ <http://www.kemi.se/en/global/rapporter/2016/report-8-16-hazardous-chemical-substances-in-textiles.pdf>

¹⁴ http://publications.jrc.ec.europa.eu/repository/bitstream/JRC36150/6150%20-%20HCHO_survey_final_report.pdf

221 articles ont été achetés dans 21 pays d'Europe (exemple : T-shirt, sous-vêtements, chaussettes, vêtements imprimés...). Les résultats ont été comparés aux limites de concentrations proposées par deux labels : Oeko-Tex et l'Ecolabel. Les limites de concentration du formaldéhyde pour les textiles en contact direct avec la peau sont respectivement de 75 mg/kg (ou 20 mg/kg pour les enfants) pour Oeko-Tex et 30 mg/kg pour l'Ecolabel. Onze pourcent des articles dépassaient la limite préconisée par l'Ecolabel et 3% dépassaient la limite préconisée par Oeko-Tex pour les adultes.

Aucune différence de concentration de relargage n'a été mise en évidence selon le pays de fabrication du vêtement.

Le rapport conclut que les chemises apparaissent comme la catégorie de vêtement présentant la plus forte probabilité de relargage de formaldéhyde à des concentrations supérieures à 30 mg/kg. De même les textiles en pur coton ou laine mélangée relarguent plus de formaldéhyde que les textiles faits de coton et d'autres fibres.

5.1.3 Rapports du RIVM (Rijksinstituut voor Volksgezondheid en Milieu)

5.1.3.1 "Hazardous substances in textile products"

Les substances classées selon le règlement CLP (CMR, toxicité spécifique pour certains organes cibles (STOT-RE), sensibilisants cutanés, toxicité aiguë cutanée) utilisées ou présentes dans les articles textiles sont nombreuses. Du fait de la durée et de la grande surface de contact entre la peau et les textiles, le RIVM a identifié et développé une méthode de priorisation pour les substances, classées sous REACH et présentes dans les textiles pouvant être à l'origine d'un effet adverse chez les consommateurs et qui ne sont pas déjà réglementées.

Le rapport¹⁵ du RIVM de 2014 sur les substances dangereuses dans les produits textiles (RIVM, 2014) explicite la méthode de priorisation des substances, enregistrées dans le règlement REACH et présentes dans les textiles en fonction de leurs dangers.

La méthode de priorisation tient compte également des usages des substances (c'est-à-dire substance utilisée lors du processus de fabrication ou intégrée dans l'article textile), de la classification des substances (CMR, toxicité aiguë cutanée, sensibilisants cutanés, STOT-RE) et de leur « puissance » (en fonction de leur classification, de leurs usages, des DNEL/DMEL disponibles).

Sept cent quatre vingt huit substances ont été identifiées par la méthode, 32 ont le score le plus élevé, principalement des colorants ou des retardateurs de flammes (cf annexe 4).

5.1.3.2 "Nanomaterials in consumer products"

En 2011, le RIVM a publié un rapport¹⁶ dont l'objectif était de détecter, caractériser et interpréter si possible, la présence de nanomatériaux dans des produits de consommation courante. Vingt cinq

¹⁵ <http://www.rivm.nl/dsresource?objectid=b0cca878-45cd-432c-85aa-e39755c4da95&type=org&disposition=inline>

¹⁶ http://www.rivm.nl/en/Topics/C/Consumer_exposure_to_chemical_substances/Nanomaterials_in_consumer_products

produits ont été analysés principalement sur la base des revendications des industriels indiquant que leur produit contenait des nanomatériaux. Le rôle de ces nanomatériaux dans les différents produits n'était pas systématiquement indiqué. Pour les produits revendiquant l'action d'un nanomatériau, la propriété de celui-ci pouvait être soit antimicrobienne, anti-moisissure ou anti-odeur.

Parmi ces 25 produits, 2 articles textiles ont été investigués : une paire de chaussette et un T-shirt. Pour la paire de chaussette, l'industriel indiquait que son produit pouvait contenir 7% de nanoargent NODOR. Le RIVM a mis en avant, à travers ses analyses, la présence d'une nanocouche d'argent de 100-200 nm présente à l'extrémité de la chaussette

En ce qui concerne le T-shirt, l'industriel indiquait la présence de nanoargent dont l'objectif était de prévenir le développement de bactéries et la génération de mauvaises odeurs. Le RIVM n'a pas été en mesure de mettre en évidence de nanoargent ou d'autres nanomatériaux dans ce T-shirt.

5.1.3.3 "Consumer exposure to chemicals in indoor environment »

En 2010, le RIVM¹⁷ a dressé un inventaire des substances potentiellement dangereuses dans l'environnement intérieur avec une focalisation sur les produits textiles d'intérieur (tapis, rideaux, vêtements ...). Les textiles utilisés dans les jouets sont exclus de l'étude. L'objectif de cette étude était de mettre en avant la présence de nouvelles substances dans les textiles d'intérieur qui nécessiteraient une réglementation spécifique. Les substances recherchées sont celles qui peuvent être incluses lors du procédé de fabrication du textile et non pas celles pouvant être ajoutées pendant le transport.

Les familles de substances potentiellement présentes dans les textiles et investiguées dans ce rapport sont :

- Les détergents et auxiliaires de détergence tels que les nonylphénols polyéthoxylates et les substances fluorées (PFOS, FTOH...), le formaldéhyde et les résines formolées,
- Les retardateurs de flammes tels que les composés polybromés (PBDE), les biphényls polychlorés – (PCB), hexabromocyclodécane –(HBCD) et les composés organophosphorés (TCPP),
- Les composés plastifiants tels que les phtalates ;
- Les agents antibactériens, pesticides (composés hydantoïnes, les composés à base d'argent, les ammoniums quaternaires, les polymères phosphonés, le DMFu, le triclosan, les organo-étains, la perméthrine et les poly(diméthylaminométhyl)styrène ;
- Les colorants ;
- Volatile organic compounds;
- Les nanomatériaux.

¹⁷http://www.rivm.nl/en/Documents_and_publications/Scientific/Reports/2010/december/Consumer_exposure_to_chemicals_in_indoor_environment_A_specific_focus_on_chemicals_from_textile_products

Le RIVM a conclu qu'il n'était pas urgent de mettre en place une action réglementaire. En effet, les textiles peuvent contenir un certain nombre de substances chimiques dangereuses mais la grande majorité de ces substances fait déjà l'objet d'une réglementation. Le faible nombre d'études d'exposition ou d'émission disponibles n'a pas permis au RIVM de réaliser une évaluation du risque sur ces substances chimiques. Cependant, le RIVM conclut que la contribution des substances chimiques présentes dans les textiles d'intérieur à la concentration totale dans l'air intérieur est faible.

5.1.4 Rapport de la société RPS (pour la Commission Européenne)

L'article 25 du règlement (UE) n° 1007/2011 prévoyait que la Commission européenne évalue les substances chimiques dangereuses présentes dans les textiles et en particulier le lien de cause à effet entre les réactions allergiques et les substances chimiques utilisées dans les textiles. Enfin, si nécessaire, il était demandé de proposer des mesures législatives dans le contexte européen.

En 2013, la société RPS a donc réalisé cette évaluation en définissant en premier lieu, ce qui était entendu par réaction allergique en lien avec le textile. A été listé l'ensemble des substances et mélanges présents dans les textiles pouvant être à l'origine de réactions allergiques.

Pour établir sa liste de substances, RPS a effectué une revue de la littérature mais a également envoyé un questionnaire aux industriels dans le but d'obtenir une liste de substances pouvant être présentes dans les textiles et potentiellement allergisantes. Les familles de substances mises en évidence sont : les colorants dispersés, les retardateurs de flamme, les conservateurs et antimicrobiens, les adoucissants, les agents fixateurs, le formaldéhyde, les parfums, les résines permettant un entretien facile, les antistatiques et les antidérapants.

Afin d'établir une priorisation de ces substances, RPS les a classées en trois catégories :

- catégorie 1 : substances sensibilisantes avec une classification harmonisée incluses dans les produits textiles ;
- catégorie 2 : substances sensibilisantes avec une classification harmonisée qui ne doivent pas être présentes dans le produit final mais qui le sont et qui peuvent induire des allergies textiles (ex : impuretés) ;
- catégorie 3 : substances irritantes avec une classification harmonisée incluses dans les produits textiles.

RPS a proposé plusieurs actions :

- Proposer de nouveaux guides d'information pour le consommateur ;
- Proposer de combiner les actions volontaires (normes, labels) avec les procédures de contrôle de la présence de sensibilisants ;
- Mettre en place d'autres mesures telles que dériver et harmoniser les valeurs limites pour les substances fortement sensibilisantes en se fondant sur une évaluation quantitative du risque, réaliser des investigations sur l'évaluation du risque et des expositions, promouvoir les actions volontaires...

5.1.5 Rapports du BfR (Bunderinstitut fur Risikobewertung)

Dans son opinion de 2012¹⁸, le BfR a fait un résumé des différentes substances présentes dans les textiles d'habillement pouvant induire des problèmes pour le consommateur principalement du point de vue de la sensibilisation cutanée. Cette opinion fournit également des recommandations et des évaluations pour certaines substances/familles de substances.

Le BfR a notamment fait un point concernant le formaldéhyde, le glyoxal, les retardateurs de flamme. Cette opinion détaille aussi les composés à base d'antimoine utilisés comme catalyseurs dans les fibres polyesters et qui a, par ailleurs, mené une étude sur le relargage de ces composés dans des simulants de sueur.

Les vecteurs de colorants, les composés organo stanniques, les biocides et les colorants sont également abordés dans ce document.

D'autre part, ce document fait le point sur les réactions allergiques dues aux textiles. Enfin la migration des substances présentes dans les textiles et l'exposition à ces substances sont abordées dans cette opinion de 2012.

En conclusion, le BfR émet notamment des recommandations sur l'arrêt de l'utilisation de certains colorants dans les textiles à savoir le Disperse Blue 1, Disperse Blue 35, Disperse Blue 106, Disperse Blue 124, Disperse Yellow 3, Disperse Orange 3, Disperse Orange 37/76, Disperse Red 1. De même, il indique que l'utilisation du 1,2,4-trichlorobenzène comme vecteur de colorant dans les textiles est dangereux. Enfin, le BfR recommande de ne plus utiliser le triclosan comme substance antimicrobienne dans les textiles.

5.1.6 Rapports du Danish EPA

5.1.6.1 "Survey of selected allergenic, disperse dyes in clothes"

Cette étude¹⁹ menée en 2014 avait pour objectif de faire un focus sur la présence d'un certain nombre de colorants dispersés allergisants dans les textiles synthétiques au Danemark.

Les textiles étudiés concernaient tant des adultes que des enfants. Ils étaient principalement en polyester, fabriqués en dehors de l'Europe, de couleurs foncées ou lumineuses. L'utilisation normale des textiles d'habillement devaient impliquer un contact prolongé²⁰ avec la peau.

Les colorants dans le cuir ou le simili cuir n'ont pas été pris en compte dans cette étude.

Les colorants testés ont été : Disperse Blue 1, Disperse Blue 3, Disperse Blue 7, Disperse Blue 26, Disperse Blue 35, Disperse Blue 102, Disperse Blue 106, Disperse Blue 124, Disperse Brown 1, Disperse Orange 1, Disperse Orange 3, Disperse Orange 37, Disperse Orange 76, Disperse Red 1, Disperse Red 11, Disperse Red 17, Disperse Yellow 1, Disperse Yellow 3, Disperse Yellow 39,

¹⁸ <http://www.bfr.bund.de/cm/349/introduction-to-the-problems-surrounding-garment-textiles.pdf>

¹⁹ <http://mst.dk/service/publikationer/publikationsarkiv/2014/maj/survey-of-selected-allergenic,-disperse-dyes-in-clothes/>

²⁰ L'expression « contact prolongé avec la peau » n'est pas expliquée dans le rapport.

Disperse Yellow 49, Disperse Orange 13, Disperse Yellow 54. Ils ont été choisis sur la base d'une revue bibliographique²¹. Aucun des colorants analysés n'a été trouvé dans les textiles testés.

5.1.6.2 "Survey and environmental and health assessment of nonylphenol and nonylphenol ethoxylates in textiles"

Cette étude²², publiée en 2013, avait pour objectif de contribuer à l'évaluation de l'étendue et de l'occurrence des nonylphénols polyéthoxylates (NPEO) et de leurs produits de dégradation (nonylphénol (NP)) dans les textiles afin de statuer sur la possibilité d'un risque pour la population danoise.

Les NPEO sont notamment utilisés dans les procédés de fabrication des textiles comme auxiliaires pour le nettoyage et le rinçage, notamment pour les textiles en laine mais également en coton. Les NPEO sont également utilisés pour teindre et blanchir les textiles. Ils peuvent aussi servir d'agent mouillant ou d'émulsifiant des huiles pour les fibres textiles.

Quinze textiles pour enfants (dont les pays de provenance étaient : la Chine, le Bangladesh, l'Inde, le Pakistan, la Turquie et le Cambodge) ont été analysés. Dans 33% des textiles analysés, il a été mis en évidence la présence de NPEO ou NP à plus de 100 mg/kg et dans 20% des textiles, à plus de 250 mg/kg. Aucun lien n'a pu être établi entre la fibre textile et la concentration en NP ou NPEO. Cependant, le Danish EPA note que les textiles provenant de Chine sont majoritairement ceux qui ont des concentrations en NP ou NPEO les plus élevées.

Le Danish EPA a également étudié l'effet du lavage sur la variation de concentration en lavant les textiles pour lesquels des NP ou NPEO avaient été mis en évidence. Les résultats ont montré une baisse des concentrations en NP ou NPEO allant de 25 à 99,9%. Ces analyses ont également montré la présence de métabolites des NPEO.

Enfin le Danish EPA a investigué la migration de NPEO du textile via la salive dans des mitaines (contenant de forts taux de NPEO). Les analyses ont montré que la migration de NPEO dans la salive était de 2%.²³

Pour conclure, le Danish EPA a réalisé une évaluation pire cas, d'un enfant portant des vêtements non lavés (jeans, sous-vêtement, gants, T-shirt et linge de lit contenant des fortes concentrations en NPEO) une fois toutes les 2 semaines. Le ratio de caractérisation du risque (RCR) obtenu est de 1,40. En réalisant un scénario pire cas mais avec des vêtements lavés, le RCR obtenu est de 0,41. Le Danish EPA conclut en indiquant les incertitudes sur ces évaluations mais également sur le fait que les concentrations trouvées dans les articles analysés sont moindres que celles relevées dans la littérature.

²¹ La période couverte par la recherche bibliographique n'est pas précisée dans le rapport.

²² <http://www2.mst.dk/Udgiv/publications/2013/02/978-87-92903-94-5.pdf>

²³ Le protocole de l'essai, le temps d'action, les quantités utilisées sont décrites dans le rapport.

5.1.6.3 "Survey and environmental and health assessment of biocidal active substances in clothing"

Cette étude²⁴ de 2014 avait pour objectif d'identifier et d'évaluer l'étendue et l'occurrence d'un risque potentiel présenté par des substances biocides actives utilisées dans les vêtements mis sur le marché danois et particulièrement les substances biocides présentes dans les textiles utilisés lors du transport en provenance des pays hors Europe.

Trente quatre textiles en contact avec la peau, majoritairement en coton ou en laine, ont été analysés. Deux substances biocides ont été retrouvées : le formaldéhyde (dans 7 échantillons à des concentrations entre 3 et 23 mg/kg de vêtement) et la perméthrine (dans 2 échantillons en laine à des concentrations entre 367 et 407 mg/kg de vêtement). Lorsque la perméthrine a été détectée, le formaldéhyde était également détecté. Des essais de migration dans la sueur artificielle ont été réalisés avec les textiles pour lesquels des biocides ont été retrouvés. Le formaldéhyde a été détecté à des concentrations entre 0,20 et 1,42 mg/kg de sueur et la perméthrine à 1,94 mg/kg.

Des essais de lavage ont également été effectués, mettant en avant le fait que le relargage du formaldéhyde était supérieur à 50% alors que celui de la perméthrine était de 30%. Le Danish EPA attendait un taux de relargage du formaldéhyde supérieur aux résultats des essais effectués.

Des évaluations de risques ont été réalisées pour ces deux biocides en prenant en compte les concentrations mesurées dans les vêtements ainsi que les concentrations dans la sueur artificielle.

La dose journalière cutanée du formaldéhyde associée à l'utilisation de vêtements est de 35 µg/kg de poids corporel/jour pour un T-shirt homme et de 5,7 µg/kg de poids corporel/jour pour un maillot de corps enfant.

Pour la perméthrine, la dose journalière cutanée est de 0,14 mg/kg pc/jour pour un maillot de corps enfant pendant 24 heures.

Enfin le Danish EPA a calculé la concentration maximale de formaldéhyde ayant migré d'un textile dans de la sueur artificielle, à savoir 1,42 mg/kg.

5.1.6.4 "Antibacterial compounds in clothing articles"

L'étude²⁵ menée en 2003 par le Danish EPA avait pour objectif d'acquérir des informations sur les substances antibactériennes (anti-odeur) présentes dans les textiles d'habillement mis sur le marché danois, de réaliser des analyses sur un échantillon de 17 textiles afin de déterminer les concentrations des substances antibactériennes sélectionnées et enfin, éventuellement, d'évaluer l'émission dans l'air des substances dans ces produits une fois lavés. Les substances recherchées étaient : le triclosan, le dichlorophène, le Kathon 893²⁶, l'hexachlorophène, le trichlocarban, le

²⁴ [http://mst.dk/service/publikationer/publikationsarkiv/2014/apr/survey-and-health-and-environmental-assessments-of-biocidal-active-substances-in-clothing-\(2\)](http://mst.dk/service/publikationer/publikationsarkiv/2014/apr/survey-and-health-and-environmental-assessments-of-biocidal-active-substances-in-clothing-(2))

²⁵ <http://eng.mst.dk/media/mst/69106/24.pdf>

²⁶ 2-N-octylisothiazoline-3-one

Kathon CG²⁷. Cinq textiles contenaient entre 0,0007% et 0,0195% de triclosan. Seule cette substance ayant été retrouvée et à des concentrations très faibles, les essais d'émission n'ont pas été réalisés.

5.1.6.5 "Polyfluoroalkyl substances (PFAs) in textiles for children"

Le Danish EPA a publié en 2015 une étude²⁸ sur les PFA dans les textiles. Cette étude avait pour objectifs notamment de déterminer les textiles pour enfants contenant des PFA, d'analyser ces composés et d'investiguer ceux qui étaient relargués pendant le port des textiles ou pendant le lavage. Les PFA identifiées sont : PFSA, PFCA, FASA, MeFASA, MeFASE, EtFASE, FTCA, FTAC, FTMAC. Ces substances sont utilisées dans les textiles pour leurs propriétés hydrofuges. Les textiles identifiés ont été les vêtements de pluie, vêtements de ski, gants, mitaines.

5.2 Identification of substances at French level

5.2.1 Databases of the French Textile and Apparel Institute (IFTH)

The research and development agreement between ANSES and the IFTH included the production of a summary of all the positive results identified by the IFTH over a two-year period.

This summary, in database form, was used to compile the following information:

- The type of detection by typology of textile clothing (identification of substances);
- The percentage of cases of detection, i.e. the proportion of positive cases and their types, out of all the textile clothing analysed by the IFTH over a two-year period;
- The level of detection (concentration, according to the limits of detection/quantification);

By comparing the data with the literature data, the aim of this summary was to draw up a sampling plan for the substances to be tested in future tests on textile clothing.

5.2.2 Data from the Technical Centre for Leather (CTC)

The research and development agreement between ANSES and the CTC included production of a summary of all the positive results identified by the CTC over a two-year period.

This summary was used to compile the following information:

- The type of detection by typology of footwear (identification of substances);
- The percentage of cases of detection, i.e. the proportion of positive cases and their types, out of all the footwear analysed by the CTC over a two-year period;
- The level of detection (concentration, according to the limits of detection/quantification);

By comparing the data with those in the literature, the aim of this summary was to draw up a sampling plan for the substances to be tested in future tests on footwear.

²⁷ Chloromethylisothiazolinone/Methylisothiazolinone

²⁸ <http://www2.mst.dk/Udgiv/publications/2015/04/978-87-93352-12-4.pdf>

5.2.3 DGCCRF studies on textile clothing in 2013

In 2013, the DGCCRF carried out a survey on the fidelity of certain articles of textile clothing.

This survey had three objectives:

- To screen for other substances (in addition to prohibited or restricted substances – azo dyes, DMFu) in textiles in direct contact with the skin (underwear, tight-fitting sport clothing, etc.) liable to cause allergic skin reactions;
- To verify proper application of Regulation (EU) No 1007/2011 of 27 September 2011 on textile fibres, in force since 8 May 2012, and particularly the new provision concerning the labelling of non-textile parts of animal origin;
- To verify the positive claims concerning technical textiles ("waterproof", "anti-UV", "antibacterial", "anti-mites", etc.) made for certain articles.

Ninety-eight samples were taken. Of these, 33% of the textiles tested were non-compliant for composition analyses (with regard to either the CLP Regulation, the nickel restriction or the REACH Regulation). Regarding the survey's primary objective, the DGCCRF emphasised the fact that:

- Many allergenic aromatic amines were found in numerous dark-coloured polyesters and polyamides (the most frequently detected amines were 2,6-dichloro-4-nitrobenzeneamine, 2-bromo-4,6-dinitrobenzeneamine and 2-chloro-4,6-dinitroaniline).
- Compounds derived from diisocyanates and polyurethane monomers were found in a significant proportion of elasthanes (4,4'-TDI, toluene 2,4-diisocyanate, isophorone diisocyanate, hexane, 1,6-diisocyanate).
- The presence of allergenic biocides was observed in some textiles.
- No non-compliance related to DMFu was found.
- Anthraquinone dyes were found (Disperse Blue 14, Solvent Red 146), especially in cellulose fibres.
- Several anti-UV compounds of the class of phenolic benzotriazoles were detected (2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol and drometrizole).

It should be noted that in this class, four phenolic benzotriazoles (UV-350, UV-327, UV-328 and UV-320) have been proposed for classification as SVHC due to their PBT (persistent, bioaccumulative, toxic) and vPvB (very persistent, very bioaccumulative) properties.

Concerning the other two objectives of the formal request, the DGCCRF noted that there seems to be a low level of compliance with the new provision concerning the labelling of non-textile parts of animal origin and with the "antibacterial" claims.

In 2014, the Joint Laboratory Service (SCL) conducted analyses in response to complaints about textiles, footwear and protective sport gear. The complaints relating to these articles mainly concerned allergic reactions developed by consumers.

- In 25% of the analyses, formaldehyde was detected at concentrations above the limit set for textiles in direct contact with the skin by the European Ecolabel for textile products (Commission Decision of 5/06/2014), i.e. 16 mg/kg. Formaldehyde was detected in several types of materials (cotton, viscose, wool, leather and polymeric materials).
- Four articles containing leather parts in contact with the skin had chromium VI concentrations above the maximum value of the REACH restriction (3 mg/kg). Furthermore, three articles containing leather parts in contact with the skin contained chromium VI, but at levels below the maximum value of the restriction.
- In 20% of the articles tested, aromatic amines were found: 2-bromo-4,6-dinitroaniline (CAS 1817-73-8); 2-chloro-4,6-dinitroaniline (CAS 3531-19-9); 2-bromo-6-chloro-4-nitroaniline (CAS 99-29-6); 2,6-dichloro-4-nitroaniline (CAS 99-30-9); 2,6-dibromo-4-nitroaniline (CAS 827-94-1).
- In 15% of the articles, diisocyanates were detected: isophorone diisocyanate (CAS 4098-71-9); 4,4'-MDI (CAS 101-68-8); 2,4-toluene diisocyanate (CAS 584-84-9).
- Rosin, used in adhesives, was found in 40% of footwear.
- Benzyl benzoate was detected in 15% of the analyses. This substance is used as a plasticiser for certain polymers.
- Several other substances were found:
 - ✓ Plasticisers in footwear: diethyl maleate (CAS 141-05-9), dibutyl fumarate (CAS 105-75-9), bis(2-ethylhexyl)fumarate (CAS 141-02-6).
 - ✓ Diacrylates and dimethacrylates, a priori from the adhesives: 1,4-butylene glycol dimethacrylate (CAS 2082-81-7), tri(propylene glycol) diacrylate (CAS 42978-66-5).
 - ✓ Anti-UV agents (oxybenzone, drometrizole).
 - ✓ Biocides (mercaptobenzothiazole, parachlorometacresol, OPP).
 - ✓ Monomers used in the synthesis of polyamide (caprolactam).

5.2.4 DGCCRF study of 2015 on textiles for children

In 2015, the DGCCRF carried out a survey on 96 textiles for children in France with the following objectives:

- firstly, to verify the fidelity of the labelling, assessed mainly with regard to Regulation (EU) No 1007/2011 of 27/09/2011 and the relevance of the claims displayed, if applicable, on the clothing,
- secondly, to ensure the mechanical and chemical safety of clothing for children, focusing primarily on compliance with the NF EN 14682 standard on the safety of children's clothing – cords and drawstrings on children's clothing, but also compliance with the REACH Regulation (azo dyes, nickel and DMFu, in particular).

This section will only describe aspects related to the chemical safety part of the campaign carried out by the DGCCRF. Out of the 96 samples analysed, a single sample was declared non-compliant and dangerous by the laboratory with regard to substances prohibited by the REACH Regulation (namely the presence of benzidine and dimethoxybenzidine).

However, even though the vast majority of textiles were compliant with the REACH Regulation, the DGCCRF also screened for other chemicals in these textiles: formaldehyde, phenol, free amines and anthraquinone dyes.

It was found that a number of substances were quantified at varying concentrations, namely:

- Free amines:
 - ✓ chlorodinitroaniline,
 - ✓ bromodinitroaniline,
 - ✓ bromodinitrobenzeneamine,
 - ✓ chlorodinitrobenzeneamine,
 - ✓ dinitrobenzeneamine,
 - ✓ bromodinitrobenzene.

Free haloamines and nitrosamines are regularly found in dark-coloured polyester textiles. These substances, which are not currently regulated, are becoming more and more widespread, since the DGCCRF found them in 70% of polyester samples analysed. In 40% of cases, concentrations above 100 mg/kg were estimated.

- Dyes:

Several anthraquinone dyes were quantified in the samples, in particular:

- ✓ Solvent red 146 (CAS 17418-58-5),
- ✓ Solvent violet 13 (CAS 81-48-1).

These dyes can be found at high concentrations (levels exceeding around a gram per kg) in textiles, both in synthetic (polyester) and natural (cotton) fibres and for several different colours, but generally bright ones.

5.2.5 ANSES's report on nanomaterials

In 2010, AFSSET published a report²⁹ in which it identified everyday consumer products containing nanomaterials and assessed the risks to the general population and the environment associated with the presence of these nanomaterials.

In its study, AFSSET highlighted the presence of nanomaterials in textiles (32 articles out of 246 products listed containing nanomaterials). This led to a risk assessment being conducted on antibacterial socks containing silver nanoparticles. AFSSET arrived at the conclusion that dermal exposure while wearing these socks was non-negligible.

²⁹ <https://www.anses.fr/fr/system/files/AP2008et0005Ra.pdf>

5.3 Acetophenone azine

In 2016 and 2017, Raison-Peyron *et al.* reported three cases in two articles relating to a new allergen: acetophenone azine, responsible for severe contact dermatitis in children from the wearing of shin pads. In 2017, a fourth case was published concerning an adult hockey player (De Fré *et al.* 2017).

This substance is found in the ethyl vinyl acetate (EVA) foam in shin pads.

The Joint Laboratory Service (SCL) confirmed the presence of this substance in the shin pads.

In the framework of this formal request and given the limited literature data available on this substance, QSAR modelling was conducted by ANSES to predict the potential skin sensitising and genotoxic effects. ANSES then funded studies on acetophenone azine to confirm these alerts. The results of these tests will be the subject of a separate study report.

5.4 RAPEX

The European Commission set up the Rapid Alert System for dangerous non-food products (RAPEX) to facilitate exchanges between the national authorities of the 31 European countries and the European Commission on dangerous products/articles placed on the market.

Every week, the Commission publishes alerts reported by the national authorities. These alerts include:

- Information on the dangerous products found;
- The risks identified;
- The measures taken by the notifying country, with the aim of preventing or restricting their use. The measures can be imposed by the national authorities (compulsory measures) or taken directly by the producers/distributors (voluntary measures).
- All the countries where the same products can be found.

The RAPEX system has been in place since 2004. A survey was carried out from 2004 to 2016 on the "Clothing, textiles and fashion items" product category, for the chemical risk and for all countries combined.

From this survey, the information below should be noted.

5.4.1 Notifier countries

From 2004 to 2016, the alerts issued by the European countries can be broken down as follows:

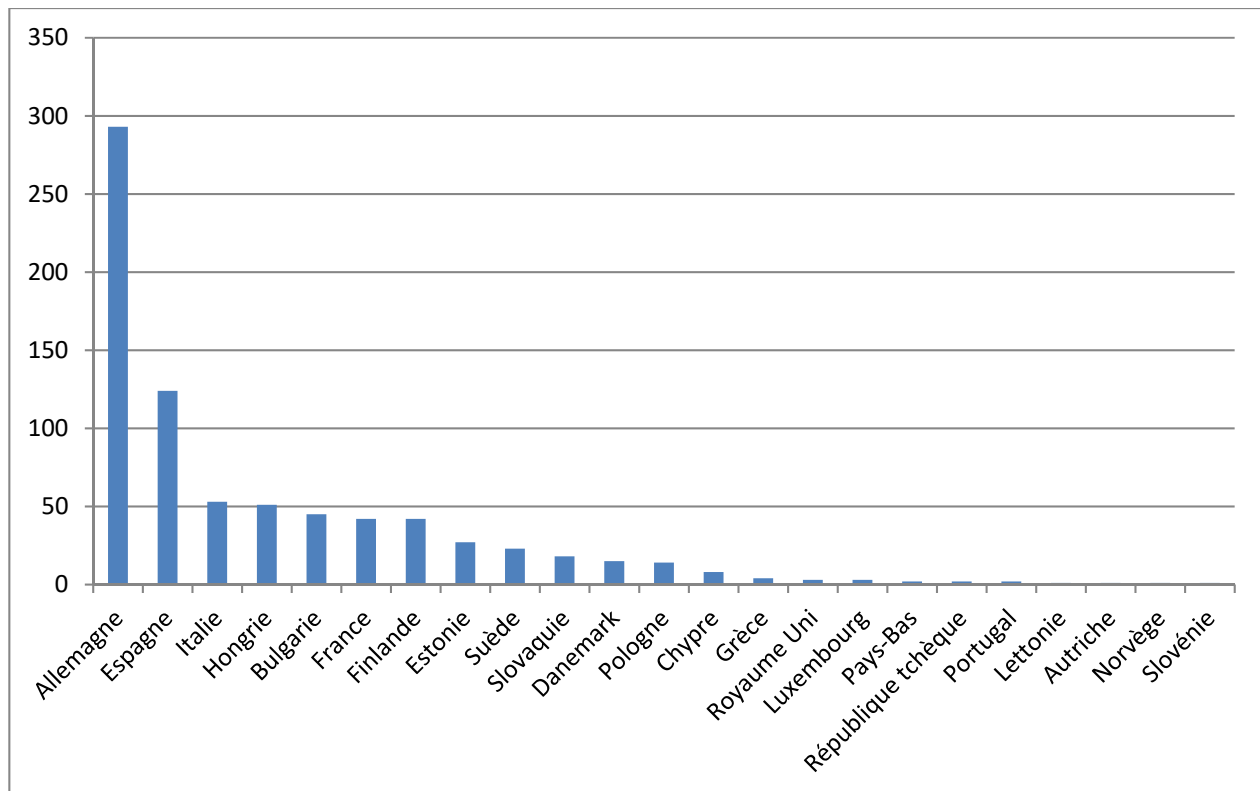


Figure 1: Alerts issued for each notifying country

This figure shows that Germany is the country that has notified the most alerts (293) in Europe since 2004. France has reported 42 alerts.

5.4.2 The chemical substances found

All notifier countries combined, the chemicals found and implicated in the textiles/clothing/fashion items are shown in the figure below.

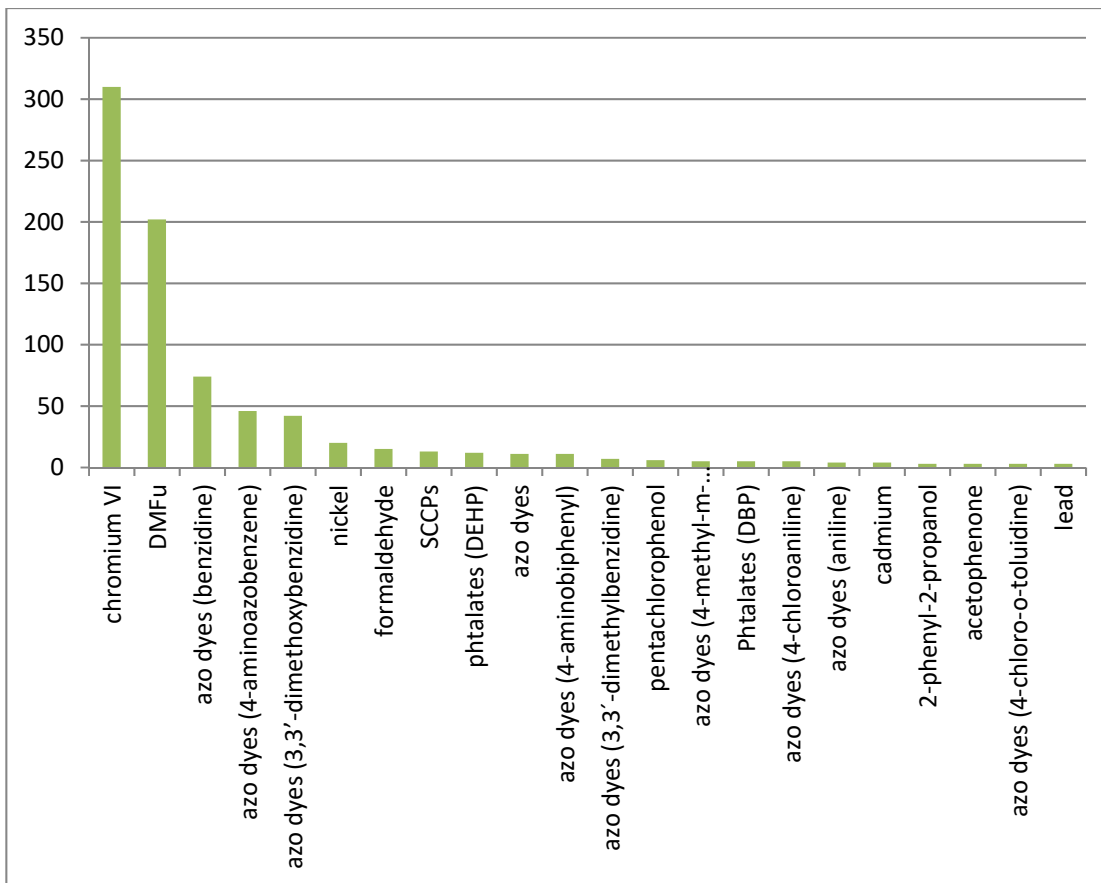


Figure 2: Substances notified between 2004 and October 2017 (RAPEX)

This graph only shows the substances for which the most notifications were received.

Chromium VI (310 notifications) is therefore the most frequently reported substance, followed by DMFu (202 notifications).

6 Tests on the new textile articles and footwear

6.1 Tests on new textile articles

In order to respond to the questions in the formal request relating to identification of the skin irritant and/or sensitising substances found in textile clothing, a research and development agreement (CRD) was established with the French Textile and Apparel Institute (IFTH).

One of the objectives of this CRD was to perform composition and migration tests on a sample consisting of new textile clothing taken from several points of sale.

These tests are not representative of the French textile clothing market, but helped:

- assess the composition of certain textiles regularly implicated in cases of contact allergies,
- modify the groups of substances that had been identified by the literature review (Section 4).

In the framework of this CRD, 25 new textile clothing articles were analysed.

By comparing the data from the reports by the European agencies with the information in the IFTH database, and applying the decision tree in Annex 5, it was possible to define the sampling plans. Two types of analysis were performed: solvent extraction and thermal extraction for the substances known as VOCs.

6.1.1 Substances tested

The substances screened for using solvent extraction or thermal desorption in textile clothing are listed in Table 3.

Table 3: List of substances screened for by the analysis laboratory in new textile clothing

Compounds analysed	Substance	CAS No.
Aromatic amines (colorants azoïques)	4-chloro-aniline	106-47-8
	4-méthyl-m-phénylène diamine	95-80-7
	4,4'-diaminodiphénylméthane	101-77-9
	o-aminoazotoluène	97-56-3
	3,3'-dichlorobenzidine	91-94-1
	4,4'-méthylènedi-o-toluidine	838-88-0
	4,4'-méthylènebis [2-chloroaniline]	101-14-4
	2,4,5-trimethylaniline	137-17-7
	o-anisidine	90-04-0
	2-naphthylamine	91-59-8
	3,3'-diméthoxybenzidine o-dianisidine	119-90-4
	4,4'-bi-o-toluidine	119-93-7
	4,4'-oxydianiline	101-80-4
	4,4'-thiodianiline	139-65-1
	4-Aminoazobenzène	60-09-3
	4-chloro-o-toluidine	95-69-2
	4-méthoxy-m-phénylène diamine	615-05-4
	5-nitro-o-toluidine	99-55-8
2-méthoxy-5-méthylbenzèneamine	120-71-8	

	Benzidine	92-87-5
	4-aminobiphényl xénylamine	92-67-1
	o-toluidine	95-53-4
APs/APEOs	NPs: 4- Nonylphénol ramifié	84852-15-3
	NPEO : 4-Nonylphénol éthoxylés	26027-38-3
	OPEOs: Octylphénol éthoxylé	9002-93-1
	4 tert octylphénol	140-66-9
	4-n-octylphénol	1806-26-4
Colorants allergènes (liste de colorants connus pour leurs effets allergisants cutanés, définie par l'IFTH)	C.I. Disperse Red 11	2872-48-2
	C.I. Disperse Orange 37=76	13301-61-6
	C.I. Disperse Yellow 9	6373-73-5
	CI Disperse Blue 1	2475-45-8
	CI Disperse Blue 3	2475-46-9
	CI Disperse Blue 7	3179-90-6
	CI Disperse Blue 26	3860-63-7
	CI Disperse Blue 35	12222-75-2
	CI Disperse Blue 102	12222-97-8
	CI Disperse Blue 106	12223-01-7
	CI Disperse Blue 124	61951-51-7
	CI Disperse Brown 1	23355-64-8
	CI Disperse Orange 1	2581-69-3
	CI Disperse Orange 3	730-40-5
	CI Disperse Orange 11	82-28-0
	CI Disperse Orange 37	12223-33-5
	CI Disperse Orange 76	13301-61-6
	CI Disperse Orange 149	85136-74-9
	CI Disperse Red 1	2872-52-8
	CI Disperse Red 17	3719-89-3
	CI Disperse Yellow 1	119-15-3
	CI Disperse Yellow 3	2832-40-8
	CI Disperse Yellow 23	6250-23-2
	CI Disperse Yellow 39	12236-29-2
	CI Disperse Yellow 49	54284-37-2
	C.I Basic Red 9	569-61-9
	C.I Basic Violet 3	548-62-9
	C.I Basic blue 26	2580-56-5
	Basic Fuchsin	632-99-5
	C.I Basic violet 14	68308-40-7
	C.I Direct black 38	1937-37-7
	C.I Direct blue 6	2602-46-2
C.I Direct Brown 95	16071-86-6	
C.I Direct Red 28	573-58-0	
CI Solvent Yellow 1	60-09-3	
CI Solvent Yellow 3	97-56-3	
Autre Colorant	1-phénylazo-2-naphthol (Solvent Yellow 14)	842-07-9
Formaldehyde	Formaldehyde	50-00-0

PAHs	Benzo[a]pyrene	50-32-8
	Acénaphthène	83-32-9
	Acénaphthylène	208-96-8
	Anthracene	120-12-7
	Benzo[a]anthracene	56-55-3
	Benzo[a]pyrene	192-97-2
	Benzo[b]fluoranthene	205-99-2
	Benzo[ghi]perylene	191-24-2
	Benzo[k]fluoranthene	207-08-9
	Benzo[j]fluoranthene	205-82-3
	Chrysene	218-01-9
	Cyclopenta[c,d]pyrène	27208-37-3
	Dibenzo[a,h]antracène	53-70-3
	Dibenzo[a,e]pyrène	192-65-4
	Dibenzo[a,h]pyrène	189-64-0
	Dibenzo[a,i]pyrène	189-55-9
	Dibenzo[a,l]pyrène	191-30-0
	Fluoranthene	206-44-0
	Fluorene	86-73-7
	Indeno[1,2,3-cd]pyrene	193-39-5
	Naphthalene	91-20-3
	Phenanthrene	85-01-8
	Pyrene	129-00-0
1-méthylpyrène	2381-21-7	
	Hydroxytoluène butylé (BHT)	128-37-0
Métaux	Cadmium	7440-43-9
	Chromium	7440-47-3
	Nickel	7440-02-0
	Chromium VI	18540-29-9
	Antimoine	7440-36-0
	Arsenic	7440-38-2
	Lead	7439-92-1
	Cobalt	7440-48-4
	Copper	7440-50-8
	Mercury	7439-97-6
Organotins	Chlorure de tributylétain	1461-22-9
	Oxyde de dibutylétain	818-08-6
Substances pour la désorption thermique		
Acides carboxyliques	Acide acétique	64-19-7
	Acide octanoïque	124-07-2
	Acide nonaoïque	112-05-0

	Méthyl dodécanoate	111-82-0
Alcanes	2,6,10,14-tétraméthyl-pentadécane	1921-70-6
Alcools	2-éthyl-1-Hexanol	104-76-7
	Phénol	108-95-2
	Cyclohexanol	108-93-0
	2-phénoxy-Ethanol	122-99-6
	Ethanol	64-17-5
	1-Propanol	71-23-8
Aldéhydes	Heptanal	111-71-7
	Benzaldéhyde	100-52-7
	Nonanal	124-19-6
	Heptanal	111-71-7
	Octanal	124-13-0
	Acétaldéhyde	75-07-0
Amides	N-Méthyl-N-phénylformamide	93-61-8
Cétones	2,6-bis(1,1-diméthyléthyl)-2,5-Cyclohexadiène-1,4-dione	719-22-2
	2-Butanone	78-93-3
Esters	Palmitate de méthyle	112-39-0
	Tétradécanoate de méthyle	124-10-7
	Laurate de méthyle	111-82-0
	Benzyl benzoate	120-51-4
	Citrate d'éthyle	77-93-0
	Acrylate de méthyle	96-33-3
Hydrocarbures benzéniques	Benzene	71-43-2
	Toluène	108-88-3
	Styrène	100-42-5
	2-phénylpropène	98-83-9
Hydrocarbures aromatiques polycycliques	2-méthyl-Naphthalène	91-57-6
	Biphényle	92-52-4
Lactames	Caprolactame	105-60-2
Phthalates	Phtalate de diéthyle	84-66-2
Soufrés	Dioxyde de soufre	05/09/7446
Ether	2,5-dihydrofurane	1708-29-8
	1,4-Dioxane	123-91-1

6.1.2 Families of textile clothing tested

As indicated previously, the families of textiles selected were those regularly implicated by the press or by dermatologist-allergists as being responsible for contact dermatitis.

In order to decide on the choice of textiles, the following were selected by the experts:

- Textile clothing in prolonged contact with the skin or in contact with the skin over a large surface:

- underwear (knickers, briefs, underpants, bras, tights);
 - specific bottomwear ("specific bottomwear" is understood to mean textile clothing such as leggings, jeggings/jeans, treggings).
- Textile clothing used in conditions where there is a significant perspiration phenomenon (e.g. sporting activities):
- sport clothing (running shirt, swimsuit, cycling wear, sport underwear).

6.1.3 Sampling sites for textile articles

Several retailers and sampling sites were targeted.

The luxury market was excluded from the study because although the substances of interest can be found here, it only concerns a limited part of the French population, whereas the population targeted by the formal request is the general population, including vulnerable populations (children, pregnant women, etc.). Similarly, purchases on the Internet were excluded from this study because it is difficult to determine the origin of the articles.

The sampling sites chosen for this study were therefore:

- "Mass market" clothing retailers;
- Clothing discount outlets;
- Supermarkets.

In each sampling category, several retailers were chosen. These retailers are represented throughout France, as well as in Europe and, for some, internationally.

6.1.4 Textile sampling protocol

From the families of textile articles targeted and the sampling categories, and given the number of textiles to be analysed in this CRD, the textile articles were purchased directly from the retailers. After purchase, the textiles were stored in the laboratory, in polyethylene plastic bags, then in sealed bags kept in the dark.

For the migration analyses, the samples were kept in special aluminium bags and placed in a freezer at -18°C.

It should be noted that the buyer (an expert at the IFTH) who purchased the textile clothing articles took into account the general appearance of the textile, its touch, smell, the label on the article indicating its composition, and the points of contact with the skin.

6.1.5 Textile articles tested

Taking the above into account, the following textiles were analysed:

Table 4: Description of the new textiles tested

Textile category	Textiles	Sampling site	Description	Composition (label)
Sport clothing	1	Clothing discounter A	Women's black-blue-violet print running bottoms	92% SPE 8% EA
	2	Clothing discounter A	Man's black-fluorescent yellow top	100% SPE
	6	Supermarket C	Women's green-blue top	100% SPE, yoke 90% SPE and 10% EA
	9	Mass market clothing D	Man's blue swimsuit	82% SPE 15% EA lining SPE
	11	Mass market clothing E	Black integrated cycling shorts	Main fabric 86% SPA 14% EA Lining 88% SPE 12% EA Elastic band 88% PA 12% EA
	12	Mass market clothing E	Man's black top and silicone textile bottom	67% PA 33% EA
	16	Clothing discounter H	Man's blue jogging bottoms with grey and white bands	100% SPE
	19	Clothing discounter I	Woman's printed swimsuit	82% PA 18% EA lining SPE
	20	Clothing discounter I	Woman's printed top	100% SPE
Underwear (excluding sport)	3	Clothing discounter A	Woman's leopard print shorty with "DREAM" written in pink print	95% CO 5% EA
	4	Clothing discounter A	Man's printed underpants	95% CO 5% EA
	7	Supermarket C	Purple satin bra	85% PA 16% EA lining SPE
	14	Mass market clothing G	Burgundy bra	Lace 100% PA, outer back fabric 83% PA 17% EA and cup lining 100% SPE
	17	Clothing discounter H	Woman's printed bra/knickers combination	Knickers: printed fabric 92% SPE 8% EA; lace 90% PA and 10% EA (cotton liner) Bra: printed fabric 92% SPE 8% EA, lace 90% PA and 10% EA
	21	Clothing discounter I	Woman's tights	90% PA 10% EA
	22	Clothing discounter I	Man's printed underpants	54% CO 41% SPE 5% EA
Specific bottomwear	5	Clothing discounter B	Woman's black leggings with gold screen-printed stripes	90% SPE 0% EA
	8	Supermarket C	Printed stretch bottoms	76% viscose 21% PA and 3% EA
	10	Mass market clothing D	Leggings with black lace	95% viscose 5% EA
	13	Mass market clothing F	Woman's black biker-type coated leggings	Main front fabric 100% SPE coating 10% PU Main back fabric 64% SPE 34% viscose 2% EA
	15	Mass market clothing G	Woman's black coated jeans	67% Lyocell 23% CO 8% SPE 2% EA
	18	Clothing discounter H	Woman's black coated leggings	95% SPE 5% EA

	23	Clothing discounter I	Woman's jeggings	black	65% CO 18% SPE 2% EA
	24	Supermarket J	Woman's jeggings	black	75% CO 24% SPE 1% EA
	25	Supermarket J	Woman's bottoms	printed	95% CO 5% EA

SPE: Synthetic polyester

EA: Elastane

CO: Cotton

PA: Polyamide/Nylon

PU: Polyurethane

6.1.6 Analyses performed

Two types of analysis were performed: solvent extraction and thermal extraction for the substances known as VOCs (volatile organic compounds).

6.1.6.1 Solvent extraction

The table in Annex 6 summarises the different methods used to extract the chemical classes screened for in textiles.

6.1.6.2 Thermal desorption extraction

This thermal extraction method is used to identify and quantify organic compounds considered as volatile or semi-volatile (comprising between 6 and 20 carbon atoms). Compounds with fewer than C6 or more than C20 carbons can still be detected, but the quantification results, and sometimes even the nature of the identification, are less accurate.

A test tube (30 mg) is placed in an empty stainless-steel tube. The sample (matrix) is heated for 30 minutes at 90°C to promote the emission of any volatile substances it contains. The compounds emitted during heating are concentrated at -15°C, then thermally desorbed to determine their nature and quantity. They are analysed after prior separation by gas chromatography (GC). Detection is carried out using mass spectrometry (MS), which can identify^{*30} and quantify^{**31} (semi-quantification) them.

³⁰ Identification is achieved by comparing the detector's response (mass spectra) with libraries of pre-recorded commercial spectra. The response after data processing is provided in the form of proposed substances ranked according to their similarity to the spectra in the libraries. Identification is achieved taking into account the identification percentage (match factor):

- > 80%: identification can provide a specific name for the substance.
- 60 to 80%: identification cannot provide a specific name for the substance. In this case the substance is identified, whenever possible, by its chemical class (e.g. "alkane", "aromatic compound") or by the identification of a chemical function found in the molecule (e.g. "siloxane derivative", "ester derivative").
- < 60%: no identification possible. The substance is classified as "nd". These substances have not been described in this report.

³¹ Quantification is achieved by external calibration using a reference substance (toluene). This is semi-quantification, the concentration of the substances is expressed in µg/g toluene equivalent rather than each substance being quantified individually with prior injection of the standard.

6.1.7 Tests carried out for each textile

Depending on the composition indicated on the label of the textile article, some of the solvent analyses could not be carried out. Indeed, some of the groups of substances chosen are only found in certain fibres. Table 5 indicates the fibres or textiles likely to contain the selected substances.

Table 5: Relationship between fibres and analyses performed using solvent extraction

Group of substances	Types of materials likely to contain these substances
Aromatic amines (azo dyes)	All dyed textiles in contact with the skin (any fibre)
Alkylphenols/alkylphenol ethoxylates	All textiles (any fibre) coated or not
Allergenic dyes	Polyester fibres (alone or in a mixture)
Formaldehyde	Pigment-dyed and screen-printed textiles
PAHs	Polyester fibres (alone or in a mixture)
Extractable metals	Polyamide fibres (alone or in a mixture)
Metals after mineralisation	Plastic accessories
Organotins	Coatings, foams, elastane fibres

6.1.8 Test results

The substances that were quantified in the 25 new textile articles tested have been summarised in Table 6:

Table 6: Results of the tests on new textiles using solvent extraction

Sample	Substances quantified	Part of the textile where the substance was quantified
1	NPEOs (26027-38-3) = 59.77 mg/kg CI Disperse Yellow 23 (6250-23-3) = 31 mg/kg	Black fabric and bottom part of black top Purple drawstring
2	1,4-paraphenylenediamine (106-50-3) = 13 mg/kg NPEOs (26027-38-3) = 79.17 mg/kg Cobalt = 10 mg/kg Copper = 2.47 mg/kg Antimony = 0.41 mg/kg	Fabric, black collar and neckband Black fabric and black collar Black button Black button Black button
3	NPEOs (26027-38-3) = 71.33 mg/kg	3-colour print
5	NPEOs (26027-38-3) = 68.67 mg/kg	Black fabric and gold screen-print
7	Chromium = 178 mg/kg Nickel = 82.34 mg/kg Cobalt = 28.32 mg/kg Copper = 54.58 mg/kg Arsenic = 84.18 mg/kg Lead = 0.27 mg/kg	Plastic adjustment hook
10	Chromium = 1.06 mg/kg Nickel = 0.1 mg/kg	Black lace Black lace
11	Chromium = 0.36 mg/kg	Black waistband
13	1,4-paraphenylenediamine (106-50-3) = 38 mg/kg 1,4-paraphenylenediamine (106-50-3) = 18 mg/kg	Black coated fabric Rear fabric SPE fibre
14	Cadmium = 0.05 mg/kg	Adjustable hook

	Chromium = 351.86 mg/kg	
	Nickel = 87.74 mg/kg	
	Cobalt = 46.76 mg/kg	
	Copper = 56.94 mg/kg	
	Arsenic = 36.50 mg/kg	
	Lead = 0.52 mg/kg	
16	NPEOs (26027-38-3) = 236.56mg/kg	Blue and grey fabric
18	1,4-paraphenylenediamine (106-50-3) = 56 mg/kg	Black uncoated surface
	Dibutyltin dichloride (683-18-1) = 0.96 mg/kg	Black coated fabric
	Monobutyltin trichloride (1118-46-3) = 1.26 mg/kg	Black coated fabric
19	Nickel = 0.1 mg/kg	
	Copper = 3.04 mg/kg	Strap fastener
	Mercury = 0.09 mg/kg	
20	1,4-paraphenylenediamine (106-50-3) = 36 mg/kg	Black mesh
22	NPEOs (26027-38-3) = 24.06 mg/kg	Screen-printed fabric
	Chromium = 3.41 mg/kg	Black waistband

It should be noted that Disperse Yellow 23 is an azo dye obtained from 1,4-paraphenylenediamine. The results of the tests on the new textiles using thermal desorption are provided in Annex 7.

6.1.9 Exploitation of results

6.1.9.1 Solvent extraction tests

After examining the results of the solvent extractions on all 25 textiles, the following was observed:

- Even though the textiles were selected because their composition/colour suggested that allergenic and/or azo dyes could be found, it appeared that none of the dyes from the list of the substances tested was quantified. The only allergenic dye found was Disperse Yellow 23 in a polyester textile, at a concentration of 31 mg/kg on purple elastic.

Although it is not possible to extrapolate the results because of the small number of textile samples tested, it can however be accepted/assumed that the list of allergenic and/or azo dyes compiled upstream and regularly tested by manufacturers as part of their product controls are perhaps not sufficient and that:

- ✓ other dyes are used to continue obtaining the desired colour without using substances that have a recommended concentration limit (as required by the different labels);
 - ✓ new formulations are placed on the market for which there are no analytical methods currently available that are able to separate and precisely identify the compounds used. This then implies that the compounds that may be sensitising/irritating by skin contact are not regulated or are not on the lists of substances "to be investigated".
- Among the raw materials of the dyes, 1,4-paraphenylenediamine was detected in four dark-coloured polyester samples at between 18 and 36 mg/kg. This substance is not regularly found in European reports or laboratory databases.

The experts therefore unanimously decided to include this substance in the sampling plan for future tests, since:

- ✓ this substance is known to be skin sensitising,
 - ✓ many articles placed on the market are made of polyester,
 - ✓ this substance results from the degradation of azo dyes that were not selected for the sampling plan. Paraphenylenediamine may therefore indicate the presence of other azo dyes that are not being investigated, and that are increasingly being used to dye polyester fibres. 1,4-paraphenylenediamine can also be used in polymers as an antioxidant.
- Regarding the class of APEOs/NPEOs, they were found in six samples (five polyester and one cotton/elastane). Of these six samples, two were not compliant with the REACH Regulation since the sum of APEOs and NPEOs exceeded 100 mg/kg. APEOs/NPEOs are used throughout the textile clothing manufacturing process, making it impossible to determine at what stage these substances are released.
- Two samples contained organotin compounds at concentrations below 2 mg/kg.
- Lastly, regarding metals, several substances were found in the plastic parts of the textiles tested (bra hooks, plastic buttons): cobalt, chromium, copper, antimony, nickel, lead, cadmium and arsenic. However, the results should be interpreted in light of the analytical methods used. Indeed, the total mineralisation method indicates the presence of metals in the article, but only the "extractable metals" method can assess the actual share of the migration of the metals into the tested sample.

6.1.9.2 Thermal desorption tests

The results of the thermal desorption testing showed that few of the substances initially targeted were found, apart from three phthalates found mainly in bra foams:

- Dibutyl phthalate (CAS 84-74-2);
- Diisobutyl phthalate (CAS 84-69-5);
- Diethyl phthalate (CAS 84-66-2).

It is not currently possible to link the presence of these phthalates with any certainty to the foam manufacturing process.

Similarly, other substances on the initial list were found, such as benzyl benzoate, BHT, phenol, hexadecanoic acid and a methyl ester.

Other substances were extracted, particularly alkanes such as heptadecane and octadecane.

The purpose of these tests was not to link an odour to the emission of semi-volatile substances.

Moreover, some textiles were highly emissive (total VOCs above 200 µg/g) but no chemical substances were quantified after solvent extraction.

6.1.9.3 General conclusion

This first series of tests, which does not fully reflect the French market, had the following objectives:

- Assess the composition of certain textiles regularly implicated in cases of contact allergies;
- Modify the groups of substances to be screened for in relation to those that had been identified by the literature review.

In 56% of the 25 textiles analysed, chemical substances were quantified. Among these textiles, the CES notes that:

- 1,4-paraphenylenediamine, a substance that had not been identified in the sampling plan, was found in 35% of them (four textile articles). The CLP Regulation has a harmonised classification for this substance as a Category 2 eye irritant and Category 1 skin sensitiser.
- Alkylphenols or alkylphenol polyethoxylates were quantified in 43% of them (six textile articles). Of these six articles, two were non-compliant with the REACH Regulation as the concentrations were above 100 mg/kg.
- In 7% of them (one article), an allergenic dye was quantified (CI Disperse Yellow 23 at 31 mg/kg). This substance has no harmonised classification but the Oeko-Tex® label recommends that the concentration of CI Disperse Yellow should not exceed 50 mg/kg.
- Extractable metals were quantified in 21% of them (three articles), but only in plastic accessories. The concentrations found never exceeded the concentration limits recommended by the Oeko-Tex® label.

As a general conclusion for this first series of tests, the CES indicated that it seemed appropriate to add 1,4-paraphenylenediamine (CAS 106-50-3) to the list of substances to be screened for in subsequent textile tests.

A toxicological focus in line with the effects investigated in the formal request will be carried out on the following substances in particular:

- 1,4-paraphenylenediamine (CAS 106-50-3);
- The Disperse Yellow 23 dye (CAS 6250-23-3);
- Benzyl benzoate (CAS 120-51-4);
- BHT (CAS 128-37-0).

Lastly, the experts looked into the effect of washing on the textiles. Indeed, the above textiles were tested without prior washing. However, the recommendations for use, shown on the labels, indicate that they should be washed before they are worn.

For textiles on which substances were found, a washing test was therefore carried out.

The washing was undertaken in accordance with the NF EN ISO 6330 Standard. The type of machine (front or top loading) and the washing parameters (including temperature) were defined with ANSES. Washing was carried out on specimens of at least 25 cm².

The washing temperatures for the samples were those recommended on the label of each sample.

Following these washing tests, the samples were again analysed by solvent extraction.

Table 7: Groups of chemicals tested per sample after washing

Tests carried out	Sample numbers concerned
Colorants azoïques (Amines aromatiques)	2, 13 (2 analyses), 18, 20
APEOs (Alkylphenols/alkylphenol ethoxylates)	1, 2, 3, 5, 16, 22
Allergenic dyes	1
Organo-Etains (ou organostanniques)	18

The textile parts collected for this sampling were not always close to where the samples had been taken for the analyses before washing. This was mainly because the amount of textile remaining was not always sufficient to allow a second sample to be taken adjacent to the first one.

The results of these tests are presented in Table 8.

Table 8: Results of the washing tests on new textiles

Sample no. 2	Sample description Woman's black biker-type coated leggings - Front 100% SPE coating PU; back 64% SPE 34% viscose 2% EA		
	Results before standardised washing	Results after standardised washing	Assumption of the analysis laboratory
Aromatic amines (azo dyes): Amines screened for on the black fabric, black collar and fluorescent yellow neckband (all SPE) – LQ = 5 mg/kg for each amine	PPD = 13 mg/kg	PPD = 18 mg/kg	Non-uniform dyeing
Alkylphenols/alkylphenol ethoxylates Substances screened for on the black fabric and black collar LQ = 20 mg/kg	NPEOs = 79,17 mg/kg	< LQ	APEOs are hydrophilic and the levels always decrease after a "wetting" stage
Sample no. 13	Sample description Man's black-fluorescent yellow top - 100% SPE		
	Results before standardised washing	Results after standardised washing	Assumption of the analysis laboratory
Aromatic amines (azo dyes): Amines screened for on the black fabric and Rear fabric SPE fibre LQ = 5 mg/kg for each amine	PPD = 38 mg/kg on the reverse of the black coated fabric (SPE) PPD = 18 mg/kg sur maille arrière fibre PES	PPD = 89mg/kg on the reverse of the black coated fabric (SPE) PPD = 13 mg/kg sur maille arrière fibre PES	Non-uniform dyeing
Sample no. 18	Sample description Woman's black coated leggings - 95% SPE 5% EA coating not specified		
	Results before standardised washing	Results after standardised washing	Assumption of the analysis laboratory
Aromatic amines (azo dyes): Amines screened for on the on the black uncoated side in contact with the skin (SPE/EA)Q = 5 mg/kg for each amine	PPD = 56 mg/kg on the black uncoated side in contact with the skin (SPE/EA)	PPD = 62 mg/kg on the black uncoated side in contact with the skin (SPE/EA)	Non-uniform dyeing
Organotins Substances screened for on the black coated fabric LQ = 0.1 mg Sn/kg and 0.2 mg/kg	DBTC = 0,49 mgSn/kg (0,96 mg/kg) MBTC = 0,85 mgSn/kg (1,26 mg/kg)	DBTC = 0,38 mgSn/kg (0,74 mg/kg) MBTC = 0,61 mgSn/kg (0,90 mg/kg)	A reduction, but possibility that this also comes from a non-homogeneous PU coating with varying organotin concentrations
Sample no. 20	Sample description Woman's printed top - 100% SPE		
	Results before standardised washing	Results after standardised washing	Assumption of the analysis laboratory
Aromatic amines (azo dyes):	PPD = 36 mg/kg	PPD = 33 mg/kg	Non-uniform dyeing

Amines screened for on the black fabric, LQ = 5 mg/kg for each amine			
Sample no. 1	Sample description Woman's black-blue-violet print running bottoms - 92% SPE 8% EA		
	Results before standardised washing	Results after standardised washing	Assumption of the analysis laboratory
Alkylphenols/alkylphenol ethoxylates Substances screened for on the waistband and the printed fabric LQ = 20 mg/kg	NPEOs = 59,77 mg/kg	NPEOs = 26 ,32 mg/kg	APEOs are hydrophilic and the levels always decrease after a wetting stage
Allergenic dyes Dyes screened for on the 3-colour printed SPE fabric and on the purple SPE waistband LQ = 5 mg/kg	C.I. Disperse Yellow 23 = 31 mg/kg sur ceinture (fil violet)	C.I. Disperse Yellow 23 =19,93 mg/kg sur ceinture (fil violet)	A reduction, but not conclusive: like the azo dyes, the allergenic dyes may be applied in a non-uniform way during the dyeing processes
Sample no. 3	Sample description Woman's leopard print dream pink shorty - 95% CO 5% EA		
	Results before standardised washing	Results after standardised washing	Assumption of the analysis laboratory
Alkylphenols/alkylphenol ethoxylates Substances screened for on the 3-colour print LQ = 20 mg/kg	NPEOs = 71,33 mg/kg OPEOs = 35,90 mg/kg	< LQ	APEOs are hydrophilic and the levels always decrease after a wetting stage
Sample no. 5	Sample description Woman's black leggings with gold screen-printed stripes - 90% SPE 10% EA		
	Results before standardised washing	Results after standardised washing	Assumption of the analysis laboratory
Alkylphenols/alkylphenol ethoxylates Substances screened for on the black fabric and gold screen-print LQ = 20 mg/kg	NPEOs = 68,67 mg/kg	< LQ	APEOs are hydrophilic and the levels always decrease after a wetting stage
Sample no. 16	Sample description Man's blue jogging bottoms with grey and white bands - 100% SPE		
	Results before standardised washing	Results after standardised washing	Assumption of the analysis laboratory
Alkylphenols/alkylphenol ethoxylates Substances screened for on the blue and grey materials LQ = 20 mg/kg	NPEOs = 236,56 mg/kg	< LQ	APEOs are hydrophilic and the levels always decrease after a wetting stage
Sample no. 22	Sample description Man's "Simpsons" underpants - 54% CO 41% SPE 5% EA		
	Results before standardised washing	Results after standardised washing	Assumption of the analysis laboratory
Alkylphenols/alkylphenol ethoxylates Substances screened for on the screen-printed fabric LQ = 20 mg/kg	NPEOs = 24,06 mg/kg	< LQ	APEOs are hydrophilic and the levels always decrease after a wetting stage

After examining these results, the CES noted that:

- The concentrations of 1,4-paraphenylenediamine before and after washing did not diminish, they even increased. The first assumption made by the CES was that the dyes containing 1,4-paraphenylenediamine in the textile articles tested are not chemically stable and that washing can "break down" the dye and release the 1,4-paraphenylenediamine. The second assumption is related to modification of the textile matrix after washing, making extraction more effective.
- The concentrations of allergenic dyes or aromatic amines are difficult to interpret, both before and after washing.
- Nonylphenols and nonylphenol ethoxylates were effectively removed by washing, which confirms the value of recommendations on use (namely washing before wearing the garment) at least with regard to these substances. These results are correlated with those presented by the Danish EPA in their study of 2013, which showed a decline in NP or NPEO concentrations ranging from 25 to 99.9%.

The experts were unable to reach a conclusion about any link between the impact of the washing and the concentrations of aromatic amines and 1,4-paraphenylenediamine before and after washing, because:

- As the sampling sites on the textiles before and after washing were not necessarily close to each other, uncertainties remain about the interpretation of the aromatic amine concentrations before and after washing. The laboratory advanced the hypothesis of a lack of uniformity in the textile's constituent materials, which the CES does not accept.
- Published studies on the impact of washing on paraphenylenediamine concentrations were not investigated.

6.2 Tests on new footwear

As with the new textile clothing articles, a research and development agreement (CRD) was established with the CTC. Tests were conducted on a sample of footwear.

These tests are not representative of the French footwear market, but helped:

- Assess the composition of certain shoes implicated in cases of contact allergies;
- Modify the groups of substances to be analysed that had been identified by the literature review.

In the framework of this CRD, 14 articles of footwear were analysed.

6.2.1 Choice of substances to be tested in footwear

Based on tests conducted since 2014, the CTC undertook a review by summarising the results of their tests over a two-year period (2013-14) concerning:

- The rate of regulatory compliance by product and by material;
- The level of detection (limits of detection/quantification/concentrations);
- The identification of the substances detected by type of footwear;

- The percentage of cases of detection (out of all the articles analysed over a two-year period: proportion of positive cases and type of cases);
- The level of detection (concentration), out of the results that were positive for at least one group of substances found in the tests carried out by the CTC over a two-year period (2013-14).

The substances concerned were: aromatic amines, formaldehyde and resins, chlorophenols, phthalates, DMFu, chromium VI (only prohibited since 05/2015), polycyclic aromatic hydrocarbons, C10-C13 chloroalkanes, dimethylformamide, allergenic and carcinogenic dyes, metals (lead, cadmium, etc.), alkylphenols and their ethoxylates, and perfluorinated chemicals (PFOS and PFOA).

After examining the CTC's results for substances detected more than 1000 times per year, the following points can be highlighted:

- Between 2009 and 2014, their cases of detection of chromium VI almost halved in the analyses performed;
- DMFu was virtually no longer found in 2014 (detected in around 1% of the analyses carried out);
- Detections of aromatic amines in leather have been steady since 2009, unlike detections of aromatic amines in textiles, which declined sharply.

6.2.2 Substances tested

Based on the substances tested in footwear by the CTC, the results of the DGCCRF's studies in 2013 and the reports by the European agencies, the following sampling plan was established.

Table 9: Substances tested in footwear (ANSES-CTC CRD)

Substance	CAS number
Chrome VI (uniquement sur les parties en cuir)	
Formaldehyde	50-00-0
Allergenic dyes ³²	/
DMFu	624-49-7
Nickel (sur les pièces métalliques en contact avec la peau)	7440-02-0
Métaux lourds (cobalt, cadmium, chrome total, plomb)	
Aromatic amines ³³	/
NMP	872-50-4

³² Allergenic dyes: Disperse Blue 1, Disperse Blue 3, Disperse Blue 7, Disperse Blue 26, Disperse Blue 35, Disperse Blue 102, Disperse Blue 106, Disperse Blue 124, Disperse Brown 1, Disperse Orange 1, Disperse Orange 3, Disperse Orange 37/76/59, Disperse Orange 149, Disperse Red 1, Disperse Red 11, Disperse Red 17, Disperse Yellow 1, Disperse Yellow 3, Disperse Yellow 9, Disperse Yellow 23, Disperse Yellow 39, Disperse Yellow 49

³³ Aromatic amines: 4-aminobiphenyl (92-67-1), benzidine (92-87-5), 4-chloro-o-toluidine (95-69-2), 2-naphthylamine (91-59-8), o-aminoazotoluene (97-56-3), 5-nitro-o-toluidine (99-55-8), 4-chloroaniline (106-47-8), 4-methoxy-m-phenylene diamine (615-05-4), 4,4'-diaminobiphenylmethane (101-77-9), 3,3'-dichlorobenzidine (91-94-1), o-dianisidine (119-90-4), 3,3'-dimethylbenzidine (119-93-7), 4,4'-dimethylene di-o-toluidine (838-88-0), p-cresidine (120-71-8), 4,4'-methylene-bis-(2-chloro-aniline) (101-14-4), 4,4'-oxydianiline (101-80-4), 4,4'-thiodianiline (139-65-1), o-toluidine (95-53-4), 4-methyl-m-phenylene diamine (95-80-7), 2,4,5-trimethylaniline (137-17-7), o-anisidine (90-04-0), 4-aminoazobenzene (60-09-3), 2,4-xylydine (95-68-1), 2,6-xylydine (87-62-7).

Substance	CAS number
2-Hydroxyméthylméthacrylate ³⁴	868-77-9
Alcool benzylique	100-51-6
2-Méthyl-4-isothiazolin-3-one(MIT)	2682-20-4
Para-tert-butylphenol	98-54-4
5-Chloro-2-méthyl-4-isothiazolin-3-one (CMIT)	26172-55-4
Résorcinol	108-46-3
4-chloro-3-methylphenol	59-50-7
Ethylène-glycol diméthacrylate ³⁵	97-90-5
Anhydride phtalique	85-44-9
2,6-Toluène diisocyanate	584-84-9
2,4-Toluène diisocyanate	91-08-7
2-phenoxyethanol	122-99-6
4-Terbutylcatéchol	98-29-3
Orthophénylphenol (OPP)	90-43-7
1-Dodécanthiol	112-55-0
1,2-benzisothiazol-3(2H)-one(BIT)	2634-33-5
Isophorone diisocyanate (*)	4098-71-9
Benzyl benzoate	120-51-4
1,3-Dibutyl-2-thiourée	109-46-6
2-octylisothiazol-3(2H)-one(OIT)	26530-20-1
Hydroquinone monobenzyl éther	103-16-2
2-mercaptobenzothiazole	149-30-4
Drometrizole	2440-22-4
4-Aminoazobenzène	60-09-3
4,4'-Diisocyanate diphenylméthane (*)	101-68-8
2-(thiocyanométhylthio)-benzothiazole (TCMTB)	21564-17-0
Bisphénol A	80-05-7
Triphénylphosphate	1330-78-5
Tricrésyl phosphate	115-86-6
Méthyl déhydroabiétate ³⁵	1235-74-1
Méthyl abiétate†	127-25-3
Acide palustrique†	1945-53-5

³⁴ Marker of the use of acrylate-based adhesives

³⁵ When three of the five substances containing the symbol † have been detected, it is considered that rosin is present in the sample.

(*) If there is any suspicion of the presence of free isocyanates after the first analysis from ultrasound extraction, an additional analysis using SPME/GC-MS is performed to confirm or refute the result.

Substance	CAS number
Acide déhydroabiétique†	1740-19-8
Acide abiétique†	514-10-3
Glutaraldéhyde	11-30-8
Acetophenone azine	729-43-1
Paraphenylenediamine	106-50-3
Benzothiazole	95-16-9
Hydroxytoluène butylé (BHT)	128-37-0
Thiurams	/
Parabènes (méthyl, éthyl, propyl)	/

In addition to the substances initially planned, the laboratory included the following substances in the tests. These substances are liable to be allergenic and/or had already been found in previous analyses:

- 1,4-butandiol diglycidyl ether (CAS: 2425-79-8);
- 3-iodo-2-propynyl carbamate (IPCB) (CAS: 55406-53-6);
- N-N'-diphenylguanidine (CAS: 102-06-7);
- N,N'-diphenyl thiourea (CAS: 102-08-9);
- N-ethyl aniline (CAS: 103-69-5);
- Bisphenol A diglycidyl ether (CAS: 1675-54-3);
- 1,6-hexamethylene diisocyanate (CAS: 822-06-0).

6.2.3 Shoes tested

The shoes tested were those obtained by the analysis laboratory. These corresponded to articles for which problems of skin irritation or allergies had been reported by customers to the retailers/brands/suppliers. The laboratory therefore obtained these pairs of shoes from the retailers/brands/suppliers.

It should be noted that in some cases, only one shoe was provided (not a pair), while in others, small shoe sizes (child) were provided. The laboratory therefore had to determine its priorities for the analyses to be carried out, due to a lack of material.

The analyses were carried out following several standards (Annex 8).

6.2.4 Test results

Different materials can be found in the shoes; the analyses carried out were therefore:

Table 10: Relationship between fibres and analyses performed using solvent extraction

Group of substances	Types of materials likely to contain these substances
Screening allergènes, paraphénylène diamine, DMFu, CrVI, Formaldéhyde, colorants azoïques, Biocides (OPP, OIT, TCMTB, 4-chloro-3-méthylphénol)	Leather
Screening allergènes, paraphénylène diamine, DMFu, colorants dispersés allergènes, formaldéhyde, colorants azoïques	Textiles
Release of nickel	Metal parts

"Screening allergens" means screening for the following substances:

Table 11: Allergen screening

Substance	CAS number
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Para-tertbutylphénol	98-54-4
BHT	128-37-0
4-chloro-3-methylphenol	59-50-7
2-phenoxyethanol	122-99-6
OPP	90-43-7
1-Dodécanthiol	112-55-0
Benzyl benzoate	120-51-4
OIT	26530-20-1
2-mercaptobenzothiazole	149-30-4
Drometrizole	2440-22-4
2-(thiocyanomethylthio)-benzothiazole (TCMTB)	21564-17-0
Bisphénol A	80-05-7
Triphénylphosphate	115-86-6
N,N'-diphénylguanidine	102-06-7
Méthyl déhydroabiétate	1235-74-1
Méthyl abiétate	127-25-3
Acide palustrique	1945-53-5
Acide déhydroabiétique	1740-19-8
Acide abiétique	514-10-3

Table 12: Results of the shoe tests

Sample	Substances quantified/detected
A - Dark blue leather shoe with metal eyelets	<p>Leather: <u>Inner lining and insole:</u> Chlorocresol = 69 mg/kg OPP = 61 mg/kg BHT = 17 mg/kg CrVI = 2.61 mg/kg Presence of rosin <u>Tongue:</u> Chlorocresol = 50 mg/kg OPP = 47 mg/kg BHT = 16 mg/kg CrVI = 2.42 mg/kg Presence of rosin <u>Upper:</u> CrVI = 1.24 mg/kg</p> <p>Others: <u>Release of nickel:</u> < 0.5 µg/cm²/week</p>
B - Child's violet sequinned leather shoe with zip closure and metal eyelets	<p>Leather: <u>Tongue and lining:</u> Formaldehyde = 5.4 mg/kg BHT = 53 mg/kg Para-tert-butylphenol = 39 mg/kg CrVI = 0.9 mg/kg <u>Insole:</u> BHT = 36 mg/kg Para-tert-butylphenol = 66 mg/kg MBT = 64 mg/kg CrVI = 0.85 mg/kg</p> <p>Others: <u>Release of nickel:</u> < 0.5 µg/cm²/week</p>
C - Black textile shoes with metal eyelets	<p>Textile: <u>Toe cap lining:</u> BHT = 57 mg/kg Benzyl benzoate = 33 mg/kg Presence of acetophenone azine <u>Tongue and main lining:</u> BHT = 43 mg/kg Benzyl benzoate = 45 mg/kg Presence of acetophenone azine</p> <p>Others: <u>Release of nickel:</u> < 0.5 µg/cm²/week</p>
D - Child's textile shoe with 1 elastic strap	<p>Textile: <u>Lining and insole:</u> MBT = 28 mg/kg</p> <p>Others: <u>Elastic:</u> MBT = 250mg/kg</p>
E - Black textile boot with elastic	<p>Textile: <u>Lining:</u> Benzyl benzoate = 22 mg/kg <u>Insole:</u> No substances found</p> <p>Others: <u>Elastic:</u> MBT = 290mg/kg</p>
F - Dark blue leather shoe (same as A but different batch)	<p>Leather: <u>Inner lining and insole:</u> Chlorocresol = 42 mg/kg OPP = 56 mg/kg BHT = 18 mg/kg CrVI = 0.74 mg/kg Presence of rosin <u>Tongue:</u> Chlorocresol = 50 mg/kg OPP = 47 mg/kg BHT = 16 mg/kg CrVI = 0.82 mg/kg Presence of rosin <u>Upper:</u> CrVI = 0.31 mg/kg</p> <p>Others: <u>Release of nickel:</u> < 0.5 µg/cm²/week</p>
G - Man's textile town shoe	<p>Leather: Chlorocresol = 62 mg/kg OPP = 135 mg/kg 2-phenoxyethanol = 14 mg/kg CrVI = 2.22 mg/kg Para-tert-butylphenol = 30 mg/kg Presence of phthalic anhydride</p> <p>Textile: <u>Inner lining:</u> Para-tert-butylphenol = 65 mg/kg BHT = 23 mg/kg <u>Toe cap inner lining:</u> Para-tert-butylphenol = presence BHT = presence Presence of 2-phenoxyethanol in both linings <10 mg/kg</p>

H - Child's white textile shoe with metal rivets	<p>Para-tert-butylphenol = presence BHT = 53 mg/kg <u>Insole:</u> Para-tert-butylphenol = 12 mg/kg BHT = presence</p> <p>Release of nickel: < 0.5 µg/cm²/week</p>	<p><u>Textile:</u> Presence of triphenyl phosphate and acetophenone azine Presence of triphenyl phosphate and acetophenone azine</p> <p><u>Others:</u></p>
I - Adult black textile trainer	<p><u>Inner lining:</u> BHT = 48 mg/kg Benzyl benzoate = 37 mg/kg <u>Toe cap inner lining and insole:</u> BHT = 13 mg/kg Benzyl benzoate = presence Presence of azobisisobutyronitrile on both linings Presence of triphenyl phosphate on toe cap inner lining Presence of 2-hydroxymethyl methacrylate on the insole</p>	<p><u>Textile:</u></p>
J - Solid-shell textile shoe with black elastic	<p><u>Inner lining and insole:</u> BHT = 11 mg/kg <u>Inner lining beneath the shell:</u> BHT = 20 mg/kg Presence of 2-phenoxyethanol on both linings (<10 mg/kg)</p> <p>Release of nickel: < 0.5 µg/cm²/week</p>	<p><u>Textile:</u> Para-tert-butylphenol = presence Para-tert-butylphenol = 80 mg/kg</p> <p><u>Others:</u> <u>Elastic:</u> BHT = 30 mg/kg MBT = 150 mg/kg</p>
K - Solid-shell textile shoe with brown elastic	<p><u>Inner lining and insole:</u> Para-tert-butylphenol = presence <u>Inner lining beneath the shell:</u> BHT = 20 mg/kg Presence of 2-phenoxyethanol on both linings (<10 mg/kg) Presence of rosin in the lining beneath the shell</p> <p><u>Elastic:</u> BHT = 30 mg/kg MBT = 120 mg/kg</p>	<p><u>Textile:</u> Para-tert-butylphenol = 40 mg/kg</p> <p><u>Others:</u></p>
L - Brown leather boot with fur and zip closure	<p><u>Leather lining:</u> Formaldehyde = 12 mg/kg <u>Insole:</u> Formaldehyde = 8 mg/kg <u>Upper:</u> CrVI = 0.35 mg/kg Presence of rosin on the self-adhesive lining between the inner and outer lining</p> <p>Release of nickel: < 0.5 µg/cm²/week</p>	<p><u>Leather:</u></p> <p><u>Others:</u></p>
M - Black leather boot with black edging	<p><u>Lining:</u> Formaldehyde = 18 mg/kg Chlorocresol = 65 mg/kg OPP = 45 mg/kg <u>Insole:</u> Formaldehyde = 7 mg/kg <u>Edging:</u> Chlorocresol: presence OPP: presence Para-tert-butylphenol = 33 mg/kg CrVI = 0.3 mg/kg <u>Upper:</u> CrVI = 0.35 mg/kg</p>	<p><u>Leather:</u></p>

6.2.5 Exploitation of results

After examining these results, regarding the 14 footwear articles tested, the CES noted that:

- DMFu was never detected;
- All the leather parts tested had hexavalent chromium concentrations of less than 3 mg/kg;
- No allergenic or disperse dyes were found among those tested;
- All the elastic (four articles) contained 2-mercaptobenzothiazole. It is not currently possible to link the presence of 2-mercaptobenzothiazole with any certainty to the degradation of a particular compound, or to a step in the shoe manufacturing process;
- Rosin was found in 36% of the articles, corroborating the results found by the Joint Laboratories Service (SCL) in 2014;
- BHT, formaldehyde, OPP and 4-chloro-3-methylphenol were found in several samples;
- Benzyl benzoate was quantified in 21% of articles (three shoes), corroborating the rate of quantification of this substance by the Joint Laboratories Service in its study of 2013;
- Azo-bis-isobutyronitrile was present in 7% of articles tested (one shoe), used either as a foaming agent or an initiator; this substance was rarely found by the analysis laboratory;
- Acetophenone azine was found in 14% of the articles (two shoes). The CES stated that it would make sense to check whether the said shoes contain EVA foams, which would confirm the assumptions made about the presence of acetophenone azine as the degradation product during the manufacture of these foams.

The main aim of the tests conducted on the new textile articles and footwear was to modify the groups of substances that had been identified by the literature review.

After examining the results, the experts decided to keep the initial lists of substances and add 1,4-paraphenylenediamine for the tests on textile clothing.

These substances will then be screened for by the analysis laboratories in the next tests carried out in the framework of this formal request.

In the next tests, the CES indicated that it would make sense to add lanolin marker compounds to the list of substances to be screened for in footwear containing fur.

7 Tests on the textile articles and footwear provided from consultations with physicians – Biomedical study

7.1 Objectives

The prevalence of contact allergies in the general population induced by the wearing of textile clothing and footwear in France is currently unknown. In addition, the literature data on the sensitising effects of chemical substances only give a partial picture of the extent of the number of allergenic substances (and their concentrations). The occurrence of contact dermatitis that may be related to the chemicals contained in textile clothing or footwear should therefore be prevented.

In the framework of the formal request, ANSES decided to undertake a biomedical study with the following objectives:

- To test the feasibility of a methodology for investigating cases of skin allergy or intolerance. This methodology seeks to characterise the existence of an association between allergic dermatitis and the presence of chemicals in an article of textile clothing or footwear.
- To identify chemicals potentially responsible for contact dermatitis relating to an article of textile clothing or footwear whose sensitising nature has not been documented.

The causality of one or more substances responsible for the occurrence of dermatitis from exposure was based on:

- the results of the medical diagnosis, including the usual allergological investigations;
- the results of the analyses of chemicals screened for in the textile clothing or footwear incriminated;
- where applicable, the results of "supplementary patch tests";
- the comparison of earlier data with the data from the literature analysis.

This project did not set out to conduct a representative study of all the cases of contact dermatitis relating to footwear or textile clothing over a given period. It was an exploratory study for identifying allergenic substances. The 2016-17 feasibility study focused on:

- a maximum of 25 cases of contact dermatitis relating to textile clothing,
- a maximum of 20 cases of contact dermatitis relating to footwear.

Depending on the results of the study, this protocol could help establish and possibly disseminate a methodology for investigating cases of skin allergy or intolerance reported by physicians, in order to gain further knowledge about the substances in question. The feasibility of the above system was tested with a sample of volunteer physicians specialised in dermatology-allergology and toxicology.

7.2 Study partners

ANSES's partners were:

- The Revidal-GERDA dermatology-allergy vigilance network, which brings together allergists from France, Belgium and Switzerland.

Eighteen dermatologist-allergists from the Revidal-GERDA network took part in the study. These physicians practise in hospitals.

- Eight of the nine poison control and monitoring centres (CAPs).

These centres are attached to university hospital centres authorised to operate a poison control centre. They provide remote consultations and consultations relating to toxic exposure. They assess the risks of acute or chronic human exposure and give advice and guidance in diagnosis, prognosis and treatment to health professionals and the public. The CAPs are actively involved in the toxicovigilance scheme and are located throughout France.

- Four occupational disease clinics (CCPPs), out of a total of 32.
- Two textile and footwear testing laboratories.
- A principal investigator.

7.3 Population concerned by the study/criteria for inclusion in/exclusion from the study

The study targeted any person, without distinction of age or sex, living in metropolitan France and presenting with a contact dermatitis whose probable cause was an article of textile clothing or footwear, and consulting or having consulted either a dermatologist-allergist from the Revidal-GERDA network or a physician from a CCPP participating in the study, or having contacted the emergency telephone hotline (RTU)

Exclusion criteria:

- Any person presenting with a dermatitis with a non-allergic origin consulting either a dermatologist-allergist from the Revidal-GERDA network or a physician from a CCPP participating in the study.
- Any person, presenting with a dermatitis possibly caused by an article of textile clothing or footwear, who contacted the RTU of a CAP and whose diagnosis was not confirmed by a physician of the Revidal-GERDA network or a physician from a CCPP.
- For this study, minors, adults protected by the law, pregnant and breastfeeding women, and individuals receiving immunosuppressive therapy were excluded.

7.4 Chosen observation or investigation method

7.4.1 Sampling plan

All the cases of contact dermatitis whose suspected origin was a chemical substance in an article of textile clothing or footwear were collected during the study. The patients were recruited from among the population concerned by the study.

7.4.2 Procedure followed for the study

7.4.2.1 Recruitment of cases

The cases eligible for inclusion in the protocol were recruited in one of the following two ways:

- From consultations with a volunteer physician from the Revidal-GERDA network or a participating CCPP.
- From a telephone call from a patient (or healthcare professional) to the RTU of a participating CAP.

7.4.2.2 General procedure for the study

Any patient presenting with a contact dermatitis suspected of being related to an article of textile clothing or footwear and consulting a physician participating in the study was asked by the doctor during the consultation if they wished to participate in the study. The physician then had to:

- inform the patient of the objectives, the various implications of this study, and give them a letter of information.
- get them to sign a document certifying their informed consent to participate in the study.
- conduct the usual examinations (patch tests) to try and identify the substance or substances responsible for the contact dermatitis. The patch tests, which are standard tools used by dermatologist-allergists in consultations, were systematically performed by the physician.
- complete an anonymised information sheet with the results of the patch tests (these were read 48 hours and 96 hours after completion of the test by the physician at a second and third consultation), a photo/diagram of the contact dermatitis and the questionnaire included in this information sheet to enable the analysis laboratories to organise their screening for substances.

The anonymisation was performed by the physician, who anonymised the questionnaire completed at the second or third consultation, to ensure that the laboratory only obtained information related to the results of the patch tests and the photos/diagrams of the dermatitis. The physician alone was able to link the identity of the patient with the completed information sheet.

During these consultations, the textiles or footwear suspected of being the probable cause of the allergic dermatitis were collected by the physicians and then sent to the above-mentioned analysis laboratories with the anonymised questionnaire, to enable them to determine and quantify the substances found in these articles that were potentially responsible for the contact dermatitis.

The doctor also sent the anonymised information sheet to ANSES to ensure the traceability of the various analyses and enable ANSES to then compile the analysis results for each case.

A Steering Committee (COPIL) was set up consisting of dermatologist-allergists, toxicologists, chemists and occupational physicians, as well as representatives from ANSES and several analysis laboratories.

The Steering Committee conducted an expert appraisal of the results of each case to determine the accountability of the substances identified in the articles with regard to the effects reported by the physician, taking into account the medical data and the data from the laboratories. A report on each case was produced by the COPIL.

The results of the analyses carried out by the laboratories and the COPIL's conclusions were then sent to the physician initially reporting the case of dermatitis.

They then informed their patient of the result of the laboratory's analyses and the conclusions of the accountability assessment carried out by the COPIL.

There were differences in the protocol between a patient consulting a CCPP physician/a Revidal-GERDA network physician compared to a person calling a CAP. More information is provided in Annex 9.

7.4.3 Tests by the analysis laboratories

The laboratories received the textile or footwear article as well as the anonymised questionnaire and carried out the analyses to identify or quantify, as far as possible, the substance(s) responsible for the contact dermatitis.

If the tests carried out using all the methods available in the laboratory were unable to identify a substance or group of substances, the laboratory investigation ceased and a report was sent to ANSES. Prior screening was carried out for the textile articles. The laboratories then applied the sampling plan defined in Annex IX.

ANSES forwarded the laboratory results to the COPIL, listing:

- all the methods used,
- the technical limitations preventing a substance from being identified (signal too weak or absence of a standard enabling identification because the substance was unknown, degradation product, metabolite, etc.).

If a new substance (or group of substances) was identified by the laboratory during the screening (a "new substance" corresponds to a substance other than those defined by ANSES and the laboratories³⁶), a review of the literature on the assessment of the substance's toxicity was carried out by ANSES, which then instructed the laboratory as to whether or not it should be added to the list of substances to be screened for/quantified in subsequent samples (after opinion issued by the COPIL).

Supplementary patch test

If this new substance probably responsible for the case³⁷ was quantified in the footwear or textile article, the analysis laboratory sent the substance in question to the dermatologist-allergist in charge

³⁶ Identification of substances between the laboratories and ANSES was carried out by comparing data from:

- the literature, mainly via the reports by the European agencies that worked on the topic,
- the databases of the analysis laboratories.

³⁷ New substances were quantified using a set of analytical methods available in the analysis laboratories along with all the appropriate analytical techniques.

of the case, after obtaining the patient's consent and if technically feasible, to enable a "supplementary patch test" to be conducted.

This "supplementary patch test" contained the substance in question so that the physician responsible for the case could test the effect on the patient and try and correlate the clinical effect observed with that found when the patient first consulted the physician.

This "supplementary patch test" had to be performed in a hospital under the responsibility of a volunteer doctor from the Revidal-GERDA network or the CCPP, consulting in the hospital environment.

7.4.4 Interpretation of the results of the analyses performed by the laboratories

The reports and results of the tests carried out by the laboratories were presented to the COPIL. For each case, the conclusions were based on:

- the conclusions of the medical diagnosis,
- the results of the analyses of the chemical substances by the laboratories,
- where applicable, the results of the "supplementary patch tests",
- the contribution of one or more substances found in the textile clothing/footwear that could result from the conditions of use. This enabled the COPIL to assess whether the origin of the substance identified in the analysis was related to the textile/footwear itself or to the article's conditions of use by the patient, such as washing, surface treatments or fragrances.

7.5 Results

Seventeen "footwear" cases and 25 "textile" cases were studied by the COPIL in the framework of the biomedical study.

These 42 cases concerned 21 women between 24 and 68 years old and 10 men between 27 and 64 years old. It should be remembered that a case represents a tested article and that where there were several articles from a single patient, each article was treated as an individual case.

These 42 cases included:

- 39 cases of patients that consulted a Revidal-GERDA physician,
- One case of a patient that contacted a CAP,
- Two cases of patients that consulted a CCPP physician.

Results will be presented according to the following situations:

- The substance suspected by the physician (positive patch test in the patient) was detected/quantified in the article,
- The substance suspected by the physician (positive patch test in the patient) was not detected/quantified in the article,

- The substance detected/quantified in the article was not tested or was negative in the patient (negative patch test),
- Could the symptoms be explained by a mechanism other than an allergy? The following decision tree (Figure 3) was applied by the COPIL depending on the above situation. It should be noted that for each case, the patient's medical information related to the case helped the COPIL conclude as to a possible link between an article, a substance and the skin manifestation.

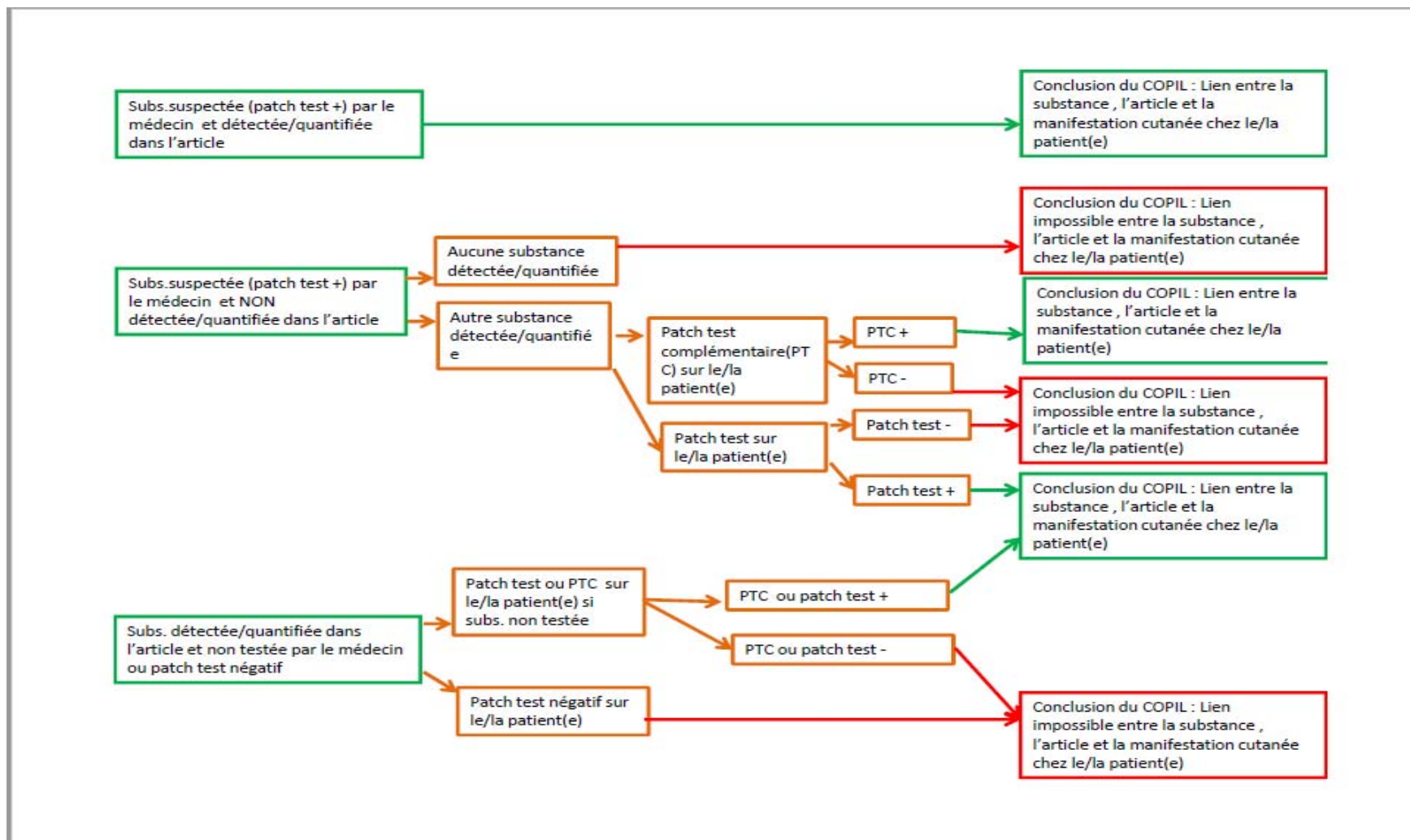


Figure 3: Biomedical study: Decision tree used by the COPIL for analysing cases

It should be noted that the COPIL is currently studying a number of cases out of the 25 "textile" and 17 "footwear" cases. Indeed, after an initial review of the results, the COPIL requested that a number of "supplementary patch tests" be performed and also requested additional information from the physicians responsible for the cases studied. These tests are currently in progress. The COPIL has not yet, therefore, been able to rule on these cases. Pending the COPIL's findings, a specific section on these cases is provided below.

It should be noted that analytical methods for detecting the class of thiurams and thioureas were not developed in the framework of these tests. It was not therefore possible to link the positivity of the tests for these substances in a patient to their presence (or absence) in the article.

7.5.1 The substance suspected by the physician was detected/quantified in the article

This section compiles all the cases resulting in a link being established between the article, the patient's skin manifestations and the substance suspected, i.e. five footwear cases and one textile clothing case.

In the study of the five footwear cases, concerning three patients, the COPIL was able to make the link between a substance detected/quantified in the footwear article and a substance suspected by the doctor during the consultations. The COPIL's results and observations are summarised in Table 13.

Table 13: COPIL conclusions for the cases where the substance suspected was the one detected/quantified in the footwear

Description of the article + areas of the foot affected	Substances suspected by the physician	Substances detected/quantified in the article	Conclusion of the COPIL
Black leather sandal with gold leather lining Area: top of the foot	Cobalt, nickel et 4-tertbutylphénolformaldéhyde (PTBPF)	Formaldehyde = 7.4 mg/kg in the lining Formaldehyde = 6.7 mg/kg in the insole Para-tert-butylphenol = 11.2 mg/kg in the lining and traces in the insole	The COPIL concluded that the origin of the allergy could be related to the 4-tert-butylphenol formaldehyde resin found in the lining of the shoe.
Black leather sandal	Chrome VI, Nickel, PTBPF	Formaldehyde = 42.2 mg/kg in the lining Formaldehyde = 12.9 mg/kg in the insole Formaldehyde = 40.5 mg/kg in the outer upper Para-tert-butylphenol = 27.8 mg/kg in the lining Para-tert-butylphenol = 21.2 mg/kg in the insole Chromium VI = 0.65 mg/kg in the insole Chromium VI = 0.77 mg/kg in the upper	The COPIL concluded that the origin of the allergy could be related to chromium VI and 4-tert-butylphenol formaldehyde resin .
Grey and silver leather sandal		Chromium VI = 7.7 mg/kg in the grey upper	

				Chromium VI = 3.3 mg/kg in the silver upper	
				Chromium VI = 1.11 mg/kg in the insole	
				Chromium VI = 0.85 mg/kg in the lining	
				Formaldehyde = 10.2 mg/kg in the lining, 95.1 mg/kg in the insole and 16.3 mg/kg in the grey upper	
				Para-tert-butylphenol = 22.1 mg/kg in the lining and 45.2 mg/kg in the insole	
White leather sandal	Chrome VI, cobalt, nickel, colophane			Chromium VI = 1.2 mg/kg in the lining, 0.61 mg/kg in the insole and 1.2 mg/kg in the outer upper. Rosin	The COPIL concluded that the symptoms could be related to the presence of chromium VI and rosin in both shoes
Multi-coloured leather sandal				Chromium VI: 1.83 mg/kg in the red leather lining, 1.72 mg/kg in the pink leather lining, 1.40 mg/kg in the ochre leather lining and 0.75 mg/kg in the rosin insole	

The COPIL was able to link the skin manifestations in a patient with the substance suspected by the physician to those detected/quantified in the article, a synthetic padded coat.

Table 14: COPIL conclusions for the cases where the substance suspected was the one detected/quantified in the textile article

Description of the article + areas of the body affected	Substances suspected by the physician	Substances detected/quantified in the article	Conclusion of the COPIL
Dark blue synthetic padded coat. Areas of the body affected: not specified	Nickel	Nickel = 2.35 mg/kg in the main inner fabric and the blue outer fabric	The COPIL concluded that the symptoms could be related to the presence of nickel detected in the article in question.

The experts noted that the substances in question were:

- 4-tert-butylphenol formaldehyde resin for two patients,
- Nickel for one patient,
- Chromium VI for two patients,
- Rosin for one patient.

7.5.2 The substance suspected by the physician was not detected/quantified in the article

7.5.2.1 No substance was detected/quantified in the article

For six cases involving textile articles, the COPIL was not able to reach a conclusion. Indeed, for each case, the physicians had suspected substances that could be responsible for the skin

manifestations in patients; but when these six articles were analysed, no substance was detected/quantified by the laboratory. Four cases came from an occupational disease clinic, and two from a consultation with a doctor from the Revidal-GERDA network.

Table 15: COPIL conclusions for the cases where no substance was detected/quantified in the textile articles

Description of the article + areas of the body affected	Substances suspected by the physician	Conclusion of the COPIL
Man's black cotton underpants with blue and pink polyamide/elastane waistband Areas of the body affected: all the lower part of the body	PPD, Mercapto mix I, MBT, Textile dye mix, Basic red 46	The COPIL was unable to reach a conclusion on this case.
Lifeguard T-shirt. Areas of the body affected: entire body	Formaldehyde	The COPIL was unable to reach a conclusion on this case.
Hospital outfit consisting of orange-yellow synthetic polyester/cotton trousers and blouse	Nickel	The COPIL was unable to reach a conclusion on this case.
Pink polyester and elastane T-shirt with a yellow polyester collar and a yellow and white screen-printed inscription Grey cotton and elastane leggings with white polyester elasticated waistband and grey polyester stitching Black polyamide tights	Nickel, Méthyl dibromo glutaronitrile, MIT, 1,3-diphénylguanidine	The COPIL indicated that the three articles studied seemed to have irritant properties but did not seem to be responsible for the allergic contact eczema

7.5.2.2 Identification and quantification of another substance by the laboratory

The COPIL ruled on two textile cases for the same patient, where the substance in question was not the one suspected by the physician during the diagnosis. The articles were a pair of pyjamas and a pair of knickers, from a consultation with a physician from the Revidal-GERDA network.

Table 16: COPIL conclusions for the cases where a substance identified by the laboratory was responsible for the manifestation (patch test not performed)

Description of the article + areas of the body affected	Substances suspected by the physician	Substances detected/quantified in the article	Conclusion of the COPIL
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Purple viscose and elastane pyjamas with white polyamide edging	CMIT/MIT, Textile dye mix	3.3'diméthoxybenzidine = 72,87 mg/kg, Benzidine = 32,2 mg/kg, HAP, Cadmium	The COPIL concluded that even though benzidine was quantified in a part of the article not in contact with the skin, a patch test for cadmium chloride should be performed to investigate the link between the article, the symptoms and the substance suspected.
Black polyamide knickers		No substance quantified	

It should be noted that for the case of the pyjamas, there was a non-compliance with the REACH Regulation (benzidine). The DGCCRF was therefore notified.

7.5.3 Other cases

Given the information available in the questionnaires completed by the physicians and the results of the analyses, the COPIL ruled on certain cases without following the decision tree.

After examining the table, it appears that the COPIL ruled on these cases by indicating that the articles implicated in the patients' skin manifestations were either vectors or substrates for external contaminants.

Table 17: COPIL conclusions for the cases where the "decision tree" was not used

Description of the article + areas of the body affected	Substances suspected by the physician	Substances detected/quantified in the article	Conclusion of the COPIL
Grey-yellow and white polyamide PPE glove with polyester coating Areas of the body affected: the entire hand	Thiruam mix, MIT, CMIT/MIT, BIT, OIT	NP, OPEO, Disperse Yellow 23, HAP, Nickel, Chrome, Cuivre, Arsenic, Plomb, DBT	The COPIL could not find a link between the patient's symptoms and the substances found during the analysis.
Black silk glove worn under a boxing glove (new and worn glove)	Chrome VI, Colophane, Baume de Perou, Thiourée, Diéthylthiourée, peroxyde de benzoyle, Huile de térébenthine, Linalol, Limonène	NP, NPEO	Given the results of the laboratory analyses, the COPIL suggested contamination of the used silk glove by the boxing glove or a cosmetic product.
Black synthetic polyester fleece Areas of the body affected: back and neck	Disulfure de tétraméthylthiurame, Néomycin sulfate, PPD, Textile dye mix, Disperse Yellow 9, Disperse Blue 106, Disperse Blue 124	Anthracene	The COPIL could not conclude as to a link between the substances detected/quantified in the clothes and the patient's symptoms.
Black biker-type polyurethane/polyester jacket	Chromium VI	Cadmium	The COPIL concluded that the jacket was possibly irritating but did not seem to be the source of the symptoms presented by the patient.

Black synthetic polyester and elastane long-sleeved T-Shirt and tights combination Areas affected: back, arm, legs	Rosin	Anthracene	After examining all the available data, the COPIL concluded that the symptoms were unrelated to the article.
White and orange trainers Area of the foot affected: Toe, extending to the foot	Myroxylon Pereirae Résine, Fragrance mix I, 4,4' Dithiomorpholine	BHT, phénoxyéthanol, Benzylbenzoate, Drométrizole	2- The COPIL concluded that the shoe was the substrate for a contaminant but did not seem to be responsible for the eczema.

The other cases are currently being studied by the COPIL. Indeed, after examining the results of the analyses carried out by the laboratory, further investigations were required in order to be able to establish or rule out a link between the article, the substance suspected by the doctor and the substance detected/quantified in the article. All these cases are listed in Table 18. Once the COPIL has ruled on these cases, this report may be amended.

Table 18: Cases currently being examined

Description of the article + areas of the body affected	Substances suspected by the physician	Substances detected/quantified in the article	Investigations in progress
Brown leather court shoe Area of the foot affected: arch, top of toes and sides	Thiuram mix, Monosulfure de tétraméthylthiurame, Disulfure de tétraméthylthiurame, Disulfure de tétradiéthylthiurame, Nickel, Mercapto mix, MBT, Mercaptobenzothiazole	Chromium VI, 2-phénoxyéthanol, Para-tert-butylphénol	Supplementary patch test required (drometizole) and investigation of the presence of MBT in the sole.
Man's brown leather sandal Area affected: instep	Chrome VI, Cobalt	Chrome VI, OPP, Para-tert-butylphénol	Supplementary patch tests for 1-dodecanthiol and OPP.
White leather sandal	Chrome VI, Nickel, PPD, colophane	Chrome VI, Formaldéhyde, BHT, MBT	Supplementary patch test required for BHT and formaldehyde releasers.
Light blue leather boat shoe Affected areas: specific lesions at the location of the tongue	4,4' Dithiomorpholine	Chrome VI, BHT, colophane	Supplementary patch test for rosin.
White trainer Affected areas: top of the feet at the location of the tongue	RAS	Chrome VI, BHT, Drométrizole	Supplementary patch test for BHT, drometizole, drometizole siloxane and potassium dichromate, and request to the laboratory to identify the presence of diaminodiphenylmethane and azodicarbonamide.
Black leather trainer Areas affected: feet and extending to the hands and lower limbs	Thiuram mix, nickel, sodium métabisulfite	BHT	Additional patch test for azodiisobutyronitrile and "supplementary patch test" for triphenyl phosphite

Description of the article + areas of the body affected	Substances suspected by the physician	Substances detected/quantified in the article	Investigations in progress
Leather sandals Areas affected: all the parts in contact with the straps	Cobalt, nickel, MIT, OIT, CMIT/MIT	Nickel, Chrome VI, Formaldéhyde, 2-phénoxyéthanol, para-tert-butylphénol, BHT, MBT	Additional extractions currently under way by the laboratory. Patch test for chromium VI to be repeated Test of the buckle on the patient
Black coated textile boots Areas affected: top of the feet	Chrome VI, Cobalt, Nickel	Chrome VI, Formaldéhyde, MBT, Acétophenone Azine	"Supplementary patch test" required for acetophenone azine
Semi-open shoe Areas affected: top of the feet and then extending to the hands, forearms, upper back	Sesquiterpène mix, textile dye mix	Chrome VI, formaldéhyde, 2-phénoxyéthanol	Additional information was sought from the physician.
Boot used in the workplace	PTBP, Chrome VI, Cobalt, Nickel	Chrome VI, Formaldéhyde, 4-chloro-3-méthylphénol, MBT	Additional information was sought from the physician.
Boot used in the workplace		Para-tert-butylphénol, benzyl benzoate, MBT	
Black fabric glove worn to avoid contact with a stick (foam pommel). Area affected: hand	Colophane, 4-aminobenzène, IPPD, Disperse yellow 0, Disperse Yellow 3, Disperse Orange 3, Disperse Orange 1, Disperse Red 1, Acid Yellow 36	Disperse Orange 37/76, Anthracène, 1-méthylpyrène, pyrène, Nickel, Cuivre	"Supplementary patch test" for Disperse Orange 37/76 and analysis of the pommel for possible diffusion through the glove
Black swimsuit with coloured polyester/polyamide edging Areas affected: folds under the breast, epigastric area	Myroxylon pereirae résine, Frangrance mix,	NPEO, HAP	"Supplementary patch test" required for CI Disperse Yellow 42
Navy blue/light blue polyester/polyamide swimsuit with white cotton lining Areas affected: folds under the breast, epigastric area		No substance quantified/detected	
White cotton screen-printed T-shirt Area affected: the entire area in contact with the T-shirt	Paraben Frangrance octocrylène, benzophénone Etoferamate, ferofibrate	NPEO, Anthracène, benzophénone	Supplementary patch test required for benzophenone quantified in the analysis (different from that seen in the patch test)

Description of the article + areas of the body affected	Substances suspected by the physician	Substances detected/quantified in the article	Investigations in progress
Black polyester/elastane tunic with screen-printed yoke Areas affected: axillary folds, extending to the arms and neckline	Fragrance mix I, Fragrance mix II, Lyril, Textile dye mix, Disperse Yellow 3, Disperse Blue mix 106/124	PPD, Aminoazobenzène, Aniline, CI Disperse Yellow 23, HAP dont naphtalène	"Supplementary patch test" required: CI Disperse Yellow 23
Black acetate/polyamide tunic and acetate lycell under the arms Areas affected: axillary folds, extending to the arms and neckline		PPD, Aniline, NPEO	
Neoprene wetsuit Areas affected: hollow of the knees and torso	RAS	HAP (dont anthracène), Nickel	Supplementary patch test required for anthracene
Black swimsuit bottoms with orange edging Areas affected: hands and friction zones	Chrome VI, Cobalt, Textile dye mix	Aniline, Chrome, HAP (dont anthracène)	"Supplementary patch test" required for CI Disperse Yellow 14 and CI Disperse Brown 1
Black bra Areas affected: hands and friction zones		PPD, Anthracène, métaux	
Black and white pullover Areas affected: hands and friction zones		PPD, NPEO	

After examining all the cases, the experts noted:

- The difficulty in ruling on cases in which the article(s) has (have) not been tested on the patient or where the test for the article was negative.
- Although not all the cases have yet been closed, a number of supplementary patch tests were required. This tends to confirm that the patch tests are unable to identify all the substances that can induce a contact allergy, particularly regarding aromatic amines (dyes).

On the other hand, these supplementary patch tests have been able to identify the use of new substances in the textile articles/footwear.

- Few of the substances suspected initially proved to be responsible for the skin manifestation.

In addition, this initial biomedical study was exploratory. The experts therefore took stock of the situation and unanimously decided to extend this study. The changes made to the next study will concern:

- increasing the number of physicians participating in the study,
- broadening the scope of the study to include bed and bath linen,
- increasing the number of cases to be included,
- lengthening the study duration.

Lastly, the experts summarised all the substances detected/quantified for the textiles and footwear in this initial biomedical study.

For the footwear, they chose to focus on all the substances quantified at least once and detected at least three times.

For the textile clothing, the experts chose to focus on all the substances quantified. They decided not to continue studying PAHs since, apart from anthracene, there are multiple sources for these substances.

In conclusion, the substances that will be covered by the review of knowledge and for which recommendations will be drafted are the following:

Table 19: Substances detected/quantified in footwear for which recommendations will be made

<u>Substance</u>	<u>Numbers of cases where the substance was quantified and/or detected</u>	<u>Number of samples where the substance was only detected</u>	<u>Number of samples where the substance could be quantified</u>	<u>Concentration range</u>
Formaldehyde	10	0	10	2,80-425 mg/kg dans le cuir
2-phenoxyethanol	17	9	7	11,3-67,90 mg/kg dans le cuir 11,30 mg/kg dans le textile
Para-tert-butylphenol	14	6	8	11,20-152 mg/kg dans le cuir 11,70 mg/kg dans le textile
Drométrizole/Drometrizole siloxane	6	2	4	11,50-50,20 mg/kg dans le cuir 12,30 mg/kg dans le textile
Chromium VI	14	0	14	3,20-19.70 mg/kg dans le cuir
OPP	13	12	1	48,40 mg/kg dans le cuir
BHT	17	8	9	12,50-57,20 mg/kg dans le cuir 11,30-70,80 m/kg dans le textile
2-mercaptobenzothiazole	6	0	6	15,10- 629 mg/kg dans les élastiques
Benzyl benzoate	4	2	2	13,20-885 mg/kg dans le textile
Nickel	1	0	1	0,58 µg/cm ² /semaine dans les parties métalliques
4-chloro-3-methylphenol	13	12	1	53,70 mg/kg dans le cuir
Rosin		7	0	-
Alcool benzylique	8	8	0	-

1-dodécanthiol	5	5	0	-
Triphénylphosphate	6	6	0	-
Paraben (éthyl, méthyl propyl)	5	5	0	-

Table 20: Substances detected/quantified in textile articles for which recommendations will be made

<u>Textile articles</u>		
<u>Substance</u>	<u>Number of times quantified</u>	<u>Concentration range</u>
Aniline	3	10-65 mg/kg
1,4-paraphenylenediamine	8	16-40 mg/kg
3.3' Diméthoxybenzidine	1	72.87 mg/kg
4 Amino azobenzène	1	45.78 mg/kg
Benzidine	1	32.20 mg/kg
Nonylphenol	2	10.16-40.84 mg/kg
Nonylphénols ethoxylés/octylphénols éthoxylés	8	32.74-708.38 mg/kg
Disperse orange 37/76	1	9.53 mg/kg
Disperse Yellow 23	2	12-582 mg/kg
Anthracene	10	0.16-2.84 mg/kg
Nickel	4	2.35-23.55 mg/kg
Chromium	2	1.39-1.40 mg/kg
(Sulfure de)cadmium	2	0.12-0.16 mg/kg
Dibutylétain	1	0.55 mg/kg

Several samples may have been taken from one article depending on the location of the skin manifestation and the different materials used in the article.

8 Summary of the toxicological data

In accordance with the formal request, a summary was produced of the toxicological data available for the skin allergenic or irritating substances, identified in this study.

For each of these substances, summarised data have been consolidated in two tables in Annex 8 showing the main physico-chemical characteristics, toxicokinetics, skin sensitising or irritant effects, chronic toxicity, and the CMR and endocrine-disrupting effects. Only the toxicological data following dermal exposure have been indicated. In their absence, data on toxicity via the respiratory and then oral routes have been mentioned. The literature sources consulted are shown in the tables for each of the substances.

9 Review by substance

9.1 1,4-paraphenylenediamine

The presence of 1,4-paraphenylenediamine in numerous articles is a concern, regardless of the origin (dye degradation or intentional addition).

This substance is a known skin sensitiser and has been classified as such. Its use is prohibited in skin cosmetics and restricted in hair colouring products (Commission Regulation (EU) No 344/2013 of 4 April 2013 amending Annexes II, III, V and VI to Regulation (EC) No 1223/2009 of the European Parliament and of the Council on cosmetic products, restricting its use). After mixing under oxidative conditions, the maximum concentration applied to hair must not exceed 2% calculated as free base.

Its presence was quantified in four new textile articles and eight samples of textile articles from the biomedical study, at concentrations ranging from 16 to 40 mg/kg.

It is not systematically screened for, particularly in the context of obtaining labels (see Section 2.7). Its presence should nevertheless be reported in personal protective equipment (PPE) according to Synamap³⁸, due to its sensitising nature³⁹.

1,4-paraphenylenediamine should be systematically screened for, regardless of its origin, and its presence in textiles and footwear should be restricted or at the very least indicated.

9.2 Benzyl benzoate

This substance has been classified as Acute Toxicity Category 4 by the CLP Regulation.

Benzyl benzoate was quantified in three articles of footwear from the biomedical study and three new footwear articles at concentrations ranging from 13 to 45 mg/kg (at 885 mg/kg in one sample but with suspected external contamination).

It was also detected from thermal extraction in eight new textile articles and 11 samples from the biomedical study.

Benzyl benzoate is subject to mandatory labelling in cosmetic products according to Regulation (EC) No 1223/2009. It is on the list of 26 allergenic fragrances.

Benzyl benzoate seems to be used in textiles as a dye accelerator in polyester and polyester/wool or as a substituent of chlorobenzenes and other aromatic solvents (biphenyls, phenyl oxides, etc.) all of which are classified as POPs.

This substance is not authorised in Europe under Regulation (EU) No 528/2012 (the Biocides Regulation) in PT18 (insecticides). However, a potential use outside the European Union as an anti-mite biocide in the manufacture, packaging or shipment of imported articles may be suspected.

³⁸ Synamap: National Trade Union for Stakeholders in the Prevention and Protection Market

³⁹ <http://www.synamap.fr/wp-content/uploads/2016/03/fiche-textile-eng.pdf>

The possible involvement of benzyl benzoate in the occurrence of contact allergies to a textile article or footwear made of a textile material should be assessed.

9.3 Chromium VI

This substance is a known skin sensitiser and has been classified as such.

For the new footwear, all the leather parts tested had levels of chromium VI below the regulatory limit of 3 mg/kg. Indeed, it was quantified in six new footwear articles at concentrations ranging from 0.3 mg/kg to 2.6 mg/kg.

In the course of the biomedical study, chromium VI was quantified in 14 samples of leather footwear at concentrations ranging between 0.25 and 19.7 mg/kg.

Chromium VI was also quantified twice in textile articles from the biomedical study at concentrations of around 1.4 mg/kg, and five times in new textile articles (concentrations between 0.35 and 3.4 mg/kg). It should be noted that chromium VI is not regulated in textiles.

Moreover, among the labels, the Oeko-Tex® label advocates the lowest levels of extractable chromium VI, namely a concentration below the limit of detection, currently set by the standard at 0.5 mg/kg. In addition, for textiles intended for children under 3 years old, the Ecolabel restricts the use of extractable chromium, with a limit set at 1 mg/kg in textiles coloured with metal complex dyes and 0.5 mg/kg for other textiles.

It should be recalled that the regulatory limit of 3 mg/kg corresponds to a threshold for sensitisation but provides no guarantee of the absence of elicitation in a patient who is already sensitised.

In one case from the biomedical study, a link was demonstrated between the presence of chromium VI in the article at a concentration below the regulatory limit (measured concentration of 1.8 mg/kg), the positivity of the patch test, and the clinical symptoms.

- **Based on the measured concentration levels and the results of the biomedical study, two recommendations can be made: Informative labelling on the presence of chromium VI in articles to facilitate secondary prevention (consumer information),**
- **Lowering the regulatory threshold in leather articles to limit the appearance of lesions in patients who are already sensitised.**

9.4 Dyes

Thirty-six dyes were screened for in new clothing articles. Only two dyes were quantified: CI Disperse Yellow 23 and CI Disperse Orange 37/76.

CI Disperse Orange 37/76 is a substance notified by manufacturers under the CLP Regulation as a skin sensitiser (Skin Sens. 1).

CI Disperse Yellow 23 has not been classified.

The dye CI Disperse Yellow 23 was quantified once in the study on new textile clothing (at 31 mg/kg) and twice in the biomedical study at concentrations ranging between 12 and 580 mg/kg.

The dye CI Disperse Orange 37/76 was quantified once in a textile article examined during the biomedical study at a concentration of 9.5 mg/kg.

No standardised patch test is currently available for these two dyes. Moreover, very few toxicological data are available, particularly concerning the irritant or allergenic mechanisms of action. **More data, toxicological in particular, should therefore be acquired on these substances.**

During the biomedical study, three dyes were quantified in textile clothing articles: CI Disperse Brown 1, CI Disperse Yellow 14 and CI Disperse Yellow 42. Supplementary patch tests are currently under way to verify their role in the occurrence of contact dermatitis in the affected patients.

9.5 Alkylphenols and alkylphenol ethoxylates

The studies focused specifically on nonylphenols (NPs) – including 4-nonylphenol, nonylphenol ethoxylates (NPEOs) and octylphenol ethoxylates (OPEOs).

4-nonylphenol is a substance notified by manufacturers under the CLP Regulation as a skin sensitiser (Skin Sens. 1) and Category 2 reprotoxic.

Nonylphenol ethoxylates are substances notified by manufacturers under the CLP Regulation as skin irritants (Skin Irrit. 2) and Category 2 reprotoxic.

Nonylphenols were quantified in two samples of textile articles from the biomedical study at concentrations ranging between 10 and 41 mg/kg.

Nonylphenols and octylphenol ethoxylates were quantified in eight samples of textile articles from the biomedical study at concentrations ranging between 33 and 710 mg/kg for NPEOs/OPEOs. Three articles were not compliant with the REACH Regulation, since the sum of the OPEOs/NPEOs/NPs exceeded 100 mg/kg.

The NPEOs/OPEOs were quantified six times during the study on the new textiles at concentrations ranging between 24 and 237 mg/kg. Of these six samples, two were not compliant with the REACH Regulation, since the sum of OPEOs and NPEOs exceeded 100 mg/kg.

The Ecolabel excludes the presence of the following substances in the final textile product when the sum of their concentrations exceeds 25 mg/kg: 4-nonylphenol, branched 4-nonylphenol, octylphenol, 4-tert-octylphenol, APEOs and their derivatives.

NPEOs/OPEOs are used throughout the textile clothing manufacturing process, making it impossible to determine at what stage these substances are released.

These substances have no harmonised classification except for branched 4-nonylphenol. A restriction under REACH on the use of NPEOs in textile articles will come into effect in February 2021. It implies a maximum NPEO concentration of 0.01%w. **This restriction will decrease the upstream use of nonylphenols, thereby reducing human exposure to these substances.**

The washing study carried out on the new textiles in which the NPEOs had been quantified showed that the NPEOs/OPEOs were effectively removed by the washing. These results are consistent with

those presented by the Danish EPA in their study of 2013, which showed a decline in NP or NPEO concentrations ranging from 25 to 99.9% after washing.

It is therefore recommended that the article be washed before it is worn for the first time.

9.6 Methyl, ethyl and propyl parahydroxybenzoates (parabens)

Methyl and propyl parahydroxybenzoates are substances notified by manufacturers under the CLP Regulation as Category 2 skin irritants.

Ethyl parahydroxybenzoate is a Category 2 skin irritant and Category 1 skin sensitiser according to the industry notifications under the CLP Regulation.

Methyl, ethyl and propyl parahydroxybenzoates (parabens) were detected in five samples of footwear from the biomedical study. None of the articles tested during the new footwear study contained these parabens.

It should be recalled that methyl and ethyl parahydroxybenzoate are subject to restrictions in the Cosmetics Regulation (EC) No 1223/2009 (namely 0.4% (as acid) for a single ester and 0.8% (as acid) for mixtures of esters).

Two assumptions can be made regarding their presence in footwear:

- The parabens could have been included as a preservative in a product during preparation of the leather.
- Or their presence in footwear from the biomedical study could be linked to external contamination rather than deliberate incorporation in the articles.

Their origin should be investigated and their role in the occurrence of skin diseases should be studied.

9.7 Butylated hydroxytoluene

Butylated hydroxytoluene (2,6-di-tert-butyl-4-methylphenol, BHT) is a substance notified by manufacturers under the CLP Regulation as Acute Toxicity Category 4.

BHT was detected or quantified in all the footwear articles analysed in the biomedical study. When it was quantified, the BHT concentrations were between 11 mg/kg and 71 mg/kg.

BHT was detected in three new articles of footwear (concentration of less than 10 mg/kg) and quantified in nine new articles of footwear at concentrations ranging between 11 and 57 mg/kg.

BHT was thermally extracted from four textile articles from the biomedical study (maximum concentration of 2 mg/kg) and eleven new textile articles (maximum concentration of 165 mg/kg).

This substance is not currently classified but according to the RMOA conducted by France in 2014, in the framework of the REACH Regulation, this substance is suspected of having an endocrine-disrupting effect on the thyroid.

Changes to the REACH Regulation regarding this substance should be monitored.

9.8 2-phenoxyethanol

2-phenoxyethanol was detected and/or quantified in all the footwear from the biomedical study. When it was quantified, the concentrations were between 11.30 and 68 mg/kg. It was also detected in seven new articles of footwear (concentrations below 10 mg/kg) but in none of the new textile articles.

This substance was quantified seven times in textile articles from the biomedical study using thermo-desorption (maximum concentration of 1.70 mg/kg).

This substance, mainly used as a solvent in the dyeing or finishing of footwear and textile articles, is regulated as an eye irritant (Eye irrit. 2) under the CLP Regulation.

It cannot be used at a concentration of more than 1% in cosmetic products, as a preservative, according to the Cosmetics Regulation (EC) No 1223/2009.

Its presence in textiles and footwear should be restricted.

9.9 Cadmium and its compounds

Cadmium is a Category 1B carcinogen, Category 2 mutagen and Category 2 reprotoxic according to the industry notifications under the CLP Regulation.

Cadmium derivatives can be used as metal dyes, but only cadmium was screened for.

Cadmium was quantified in two textile articles from the biomedical study at concentrations ranging between 0.12 and 0.16 mg/kg.

The cadmium content in polymers or metallic coatings is restricted under the REACH Regulation to 0.01%w, i.e. 100 mg/kg. Cadmium and some of its derivatives are also included on ECHA's candidate list for authorisation.

The labels impose maximum concentration limits of extractable cadmium not to be exceeded (0.1 mg/kg for the Oeko-Tex® label, and 0.1 mg/kg for textiles intended for children under 3 years old for the Ecolabel).

The presence of cadmium and those of its derivatives that have been classified as carcinogens should be restricted to the lowest possible concentrations in textile articles and footwear.

9.10 Nickel

Nickel is a substance classified as a Category 1 skin sensitiser and Category 2 carcinogen.

Nickel was quantified in four textile articles from the biomedical study at concentrations between 2.3 and 23.5 mg/kg, in the non-metal parts of the textile articles. It was also quantified once in the buckle of a footwear article from the biomedical study (0.58 µg/cm²/week), which is not compliant with the REACH restriction (0.50 µg/cm²/week for metal accessories in direct and prolonged contact with the skin).

In two textile cases from the biomedical study, the quantified concentrations for nickel did not meet the recommendations of some of the labels⁴⁰, namely 4 mg/kg for articles in direct contact with the skin for the Oeko-Tex® label (1 mg/kg for textiles for babies) and between 0.5 and 1 mg/kg for textiles for children under 3 years old according to the Ecolabel.

A regulatory limit for the use of nickel in textile articles should be defined.

9.11 2-mercaptobenzothiazole

This substance is a known skin sensitiser and has been classified as such.

It is not systematically screened for or measured, particularly in the context of obtaining labels (GOTS, Ecolabel, Oeko-Tex®).

This substance was quantified six times in footwear from the biomedical study at concentrations ranging between 15 and 629 mg/kg. It was quantified five times in new footwear articles at concentrations ranging between 28 and 250 mg/kg.

2-mercaptobenzothiazole is mainly found in the elastic parts or in the foams of footwear because this substance is used in the manufacture of rubber.

Given the classification of 2-mercaptobenzothiazole, its presence in footwear should be restricted or indicated.

9.12 Biocides

Four biocidal substances were screened for in footwear: orthophenyl phenol (OPP), 2-(thiocyanomethylthio)-benzothiazole (TCMTB), 4-chloro-3-methylphenol (or chlorocresol) and octylisothiazolinone (OIT).

Two were detected and/or quantified in footwear: OPP and 4-chloro-3-methylphenol (or chlorocresol).

OPP was detected in twelve articles of footwear from the biomedical study (i.e. at concentrations below the limit of quantification of 40 mg/kg) and was quantified once at 48 mg/kg in a leather article.

The presence of 4-chloro-3-methylphenol was detected (i.e. at concentrations below the limit of quantification of 40 mg/kg) in twelve articles of footwear from the biomedical study and it was quantified once at 54 mg/kg in a leather article.

⁴⁰ GOTS: nickel residues must not exceed 200 mg/kg.

In addition, these two substances were quantified four times in new leather footwear articles (between 45 and 135 mg/kg) for OPP, and five times for 4-chloro-3-methylphenol (between 50 and 69 mg/kg).

These two substances are classified as skin sensitisers (Skin sens. 1 according to the CLP Regulation) and are authorised as biocidal substances in leather articles: 4-chloro-3-methylphenol is authorised in PT6 and PT9 at respective maximum concentrations of 3 to 5 g/kg and 1.2 g of substance per kilo of leather, and OPP is authorised in PT6.

With regard to leather, the Oeko-Tex® label advocates OPP concentrations below 750 mg/kg in direct contact with the skin (and for preservative and non-biocide properties) and 250 mg/kg for babies. The Ecolabel excludes the use of biocidal products in fibres.

For 4-chloro-3-methylphenol, the Oeko-Tex® label requires concentrations to be below 300 mg/kg in leather articles in direct contact with the skin (and for preservative and non-biocide properties) and 150 mg/kg for babies.

Monitoring of these substances should be continued.

9.13 Aniline

Aniline is a substance classified as a Category 2 carcinogen and Category 1 skin sensitiser.

It was quantified three times in the textile articles at concentrations ranging between 10 and 65 mg/kg.

Its presence in textile articles and footwear should be restricted/prohibited regardless of the origin (dye degradation or intentional addition).

9.14 Formaldehyde and para-tert-butylphenol

Formaldehyde was quantified ten times in footwear from the biomedical study (up to 425 mg/kg) and five times in new footwear (up to 22 mg/kg).

The presence of this substance in the analyses, in conjunction with the presence of para-tert-butylphenol, can be an indicator of the presence in footwear of para-tert-butylphenol formaldehyde resin. Para-tert-butylphenol was quantified in six articles of footwear from the biomedical study (at concentrations ranging up to 152 mg/kg) and in six new footwear articles (at concentrations ranging up to 80 mg/kg). This substance is prohibited in cosmetic products and is classified as a Category 2 skin irritant and Category 2 reprotoxic.

Formaldehyde is a Category 1B carcinogen and a 1B skin sensitiser, classified and recognised as such. **A restriction measure led by the European Commission under the REACH Regulation is currently being considered.**

Para-tert-butylphenol should be substituted in glues or resins.

9.15 Drometrizole

A UV absorber, drometrizole is a Category 1B skin sensitiser according to the industry notifications under the CLP Regulation. Cases of allergies have been reported from wearing clothing.

Drometrizole was only quantified in four footwear articles from the biomedical study at concentrations ranging between 11 and 50 mg/kg.

The occurrence of allergic reactions related to the presence of drometrizole in textile articles and footwear should be monitored.

9.16 Other substances

Substance	Number detected in new footwear	Number detected in new textile articles	Number detected in footwear from the biomedical study	Number detected in textile articles from the biomedical study
3,3'-Diméthoxybenzidine	0	0	0	1/1
Benzidine	0	0	0	1/1
4-Aminoazobenzène	0	0	0	1/1
Dibutylétain	0	0	0	1/13
Alcool benzylique	0	1/25	8	0
1-Dodécanthiol	0	0	5	0
Triphénylphosphate	2	0	6	0
Rosin	4	0	6	0
Anthracene	0	0	0	10/21

The substances listed in the table above were quantified only once in the textile articles from the study, or were only detected in footwear.

These substances could be involved in skin sensitisation/irritation associated with textile clothing and footwear. As these substances were only quantified once or only detected, **it is recommended that investigations be conducted to confirm their presence and determine their concentrations in the articles.**

This confirms the benefits of not limiting screening to substances that are classified or whose use in such articles is known, particularly for footwear.

10 Uncertainties

In order to be able to judge the limitations of this expert appraisal, the sources of uncertainty and the limitations associated with the approach followed need to be analysed (ANSES, 2017). Uncertainties may be present during the substance selection and analysis processes, as well as in the biomedical study. The analysis reported here examined these different steps. It especially focused on the choices that can lead to uncertainty in the conclusions in terms of recommendations. The table below provides a structured list of the various sources of uncertainty identified.

Table 21: List of uncertainties in the expert appraisal

Source of uncertainty	Origin	Estimated impact on the conclusions of the expert appraisal
Selection of the substances		
Taking European reports into account	-	Substance groups not taken into account
Study on the new textiles/footwear Sampling plan	1/ Assumption based on the experts' judgement 2/ Funding allocated to the study	Substance groups not taken into account
Biomedical study		
Choice of the substances analysed For footwear, only certain groups of substances were screened for	Assumption based on the laboratory experts' judgement	In the conclusions of the cases, underestimation of the number of cases of skin allergy/irritation related to these substances, or impossible to conclude.
Analytical tests on the footwear Quantification not performed (40-50% of substances)	Methodological choice	Impossible to establish a link between the presence of the substance and the patient's symptoms
Analytical tests on the footwear/textile clothing articles No quantification of the substances	Analytical limit	Impossible to establish a link between the presence of the substance and the patient's symptoms
Analytical tests on the footwear and on the textile clothing articles Substances screened for but non-detection of substances, related to the values of the limits of detection	Analytical limit	Underestimation of the number of skin allergenic/irritant substances in the event that the substances are not detected
Analytical tests Analytical methods not developed (thiurams, thiocarbamates)		Non-detection/quantification of substances – Underestimation of the number of skin allergenic/irritant substances
Patch tests with the article	Performance limits of patch tests	Over- or underestimation of the result
Choice of population Only adults were included in the biomedical study	Assumption based on the fact that obtaining the agreement of the French Institutional Review Board (CPP) to set up the biomedical study was less constraining if children were not included.	Underestimation of the number of cases of skin allergy/irritation

Source of uncertainty	Origin	Estimated impact on the conclusions of the expert appraisal
Interpretation on the link between the analysis and the patient's symptoms External contamination	Contamination of the article through its use	Link difficult to establish between the article and the patient's symptoms
Recruitment of investigators Voluntary participation of physicians Physicians consulting in hospitals mandatory	Choice validated by the CPP	Underestimation of the number of cases of skin allergy/irritation Non-uniform coverage of French territory for the inclusion of patients
Toxicological profiles		
Non-exhaustive search for toxicological data	1/ Limited time for responding to the formal request 2/ Data availability	Underestimation of the potential effects of certain substances

11 Conclusions and recommendations of the Expert Committee on "Consumer Products"

This formal request aimed to conduct a review of knowledge on the skin irritant and/or sensitising chemicals liable to be found in footwear and textile clothing.

The analysis of the European studies carried out on the subject helped identify the great diversity of substances that can be found in the footwear and/or clothing and implicated in cases of skin allergies/irritations. European initiatives are also currently in progress in the framework of the REACH Regulation with a view to limiting consumer exposure to these substances: a proposal to restrict substances classified as skin sensitising or irritating according to the CLP Regulation and found in textiles and leather articles (see 2.9.2), and a restriction proposal led by the European Commission relating to Category 1A and 1B carcinogenic, mutagenic and reprotoxic substances (see Section 2.9.1).

Two studies on new footwear and textile clothing were conducted in the framework of this formal request, in order to modify the groups of substances to be screened for in the biomedical study relative to those identified in the literature.

The biomedical study served to:

- implement a methodology for investigating cases of skin allergy or intolerance reported by specialist physicians, in order to gain further knowledge about the substances in question.
- check, in some cases, the presence (or absence) of these substances in footwear and/or clothing and establish a link with any possible skin allergy or irritation in the patient. For example, DMFu and several allergenic dyes, which were specifically screened for, were never found in certain articles analysed.
- confirm the presence of Category 1A-1B CMR substances: formaldehyde, para-tert-butylphenol, chromium VI and nickel in footwear; 3,3'-dimethoxybenzidine, benzidine, 4-aminoazobenzene, PAHs, nickel, chromium VI and cadmium in textile clothing,
- identify articles that do not comply with the regulations in force.
- highlight the absence of analytical methods for thiurams, thioureas and dithiocarbamates.
- confirm that the regulatory thresholds do not provide protection from elicitation, particularly in the case of chromium VI.

The expert appraisal served to:

- draw up a list of substances of interest:
 - o for footwear, these were formaldehyde, 2-phenoxyethanol, para-tert-butylphenol, drometizole/drometizole trisiloxane, chromium VI, orthophenyl phenol, butylated hydroxytoluene, 2-mercaptobenzothiazole, benzyl benzoate, nickel, 4-chloro-3-methylphenol, rosin, benzyl alcohol, 1-dodecanthiol, triphenyl phosphate, methyl, ethyl and propyl hydroxybenzoates.
 - o for textile articles, these were aniline, 1,4-paraphenylenediamine, 3,3'-dimethoxybenzidine, 4-aminoazobenzene, benzidine, NPs/NPEOs/OPEOs, certain dyes (CI Disperse Yellow 23 and CI Disperse Orange 37/76), anthracene, nickel, chromium, derivatives of cadmium and dibutyltin.

- identify or confirm the presence of several substances of concern: for example, 1,4-paraphenylenediamine, aniline and benzyl benzoate were quantified without their origin being identified.
- find substances known for their sensitising nature that are not systematically screened for, such as 1,4-paraphenylenediamine. Thus, the labelling schemes cannot guarantee the absence of substances of concern.
- confirm the need to wash the clothing before it is worn for the first time, particularly for removing nonylphenols and nonylphenol ethoxylates.
- underline the presence of substances in the article whose origin may be related to the packaging, storage or shipment.
- identify the presence of acetophenone azine (whose origin is unknown) detected in different types of articles. The lack of knowledge on the toxicity of this substance prompted the toxicological tests in progress.

On the basis of the conclusions, the CES is issuing the following recommendations.

Recommendations by substance

- 1,4-paraphenylenediamine: this substance should be systematically screened for, regardless of its origin, and its presence in textiles and footwear should be kept to a minimum.
- Benzyl benzoate: the possible involvement of this substance in the occurrence of contact dermatitis in a textile article or footwear made of a textile material should be assessed.
- Chromium VI:
 - o informative labelling on the presence of this compound in articles would facilitate secondary prevention (consumer information),
 - o lowering the regulatory threshold in leather articles would limit the appearance of lesions in patients who are already sensitised.
- Dyes:
 - o toxicological data should be acquired for CI Disperse Orange 37/76 and CI Disperse Yellow 23,
 - o among the three dyes quantified in the biomedical study (CI Disperse Brown 1, CI Disperse Yellow 14 and CI Disperse Yellow 42), supplementary patch tests are currently under way in order to verify their role in the occurrence of contact dermatitis in the affected patients.
- Alkylphenols and alkylphenol ethoxylates:
 - o a restriction on the use of NPEOs in textile articles will come into effect in February 2021. It implies a maximum NPEO concentration of 0.01%w. This restriction will decrease the upstream use of nonylphenols, thereby reducing human exposure to these substances,
 - o It is recommended that the article be washed before it is worn for the first time, in order to reduce the concentration of these substances.
- Methyl, ethyl and propyl parahydroxybenzoates (parabens): their origin should be investigated and their role in the occurrence of skin diseases should be studied.

- Butylated hydroxytoluene: changes to the REACH Regulation regarding this substance should be monitored.
- 2-phenoxyethanol: its presence in textiles and footwear should be restricted.
- Cadmium and its compounds: the presence of cadmium and those of its derivatives that have been classified as carcinogens should be restricted in textile articles and footwear.
- Nickel: a regulatory limit for the use of nickel in textile articles should be defined.
- 2-mercaptobenzothiazole: given this substance's classification, its presence in footwear should be restricted or indicated.
- Biocides: monitoring should be continued for orthophenyl phenol (OPP), 2-(thiocyanomethylthio)-benzothiazole (TCMTB), 4-chloro-3-methylphenol (or chlorocresol) and octylisothiazolinone (OIT).
- Aniline: its presence in textile articles and footwear should be restricted/prohibited regardless of the origin (dye degradation or intentional addition).
- Formaldehyde and para-tert-butylphenol: a restriction measure led by the European Commission as part of the REACH Regulation is currently being considered for formaldehyde. Para-tert-butylphenol should be substituted in glues or resins.
- Drometrizole: the occurrence of allergic reactions related to the presence of drometrizole in textile articles and footwear should be monitored.
- Other substances: 3,3'-dimethoxybenzidine, benzidine, 4-aminoazobenzene, dibutyltin, benzyl alcohol, 1-dodecanthiol, triphenyl phosphate, rosin and anthracene may be involved in skin sensitisation/irritation relating to textile clothing and footwear. As these substances were only quantified once or only detected, it is recommended that investigations be conducted to confirm their presence and determine their concentrations in articles.

Recommendations for the medical community regarding the biomedical study protocol

This initial biomedical study was exploratory. After a first review, the decision was made to extend this study (2017-2018). A second phase of the study thus began in October 2017 and will end in October 2018. Improvements have been made to the protocol of the exploratory study, including:

- increasing the number of physicians participating in the study,
- broadening the scope of the study to include bed and bath linen,
- increasing the number of cases to be included,
- lengthening the study duration.

The experts also recommend that the scheme for investigating the causality of cases of dermatitis from footwear and textile clothing **be secured for the longer term**.

To this end, three areas for improvement were identified:

- Better initial care for the patient with rapid consultation of specialists (dermatologist-allergists) through an optimised territorial coverage of the biomedical study. Including dermatologist-allergists outside hospital centres will achieve this objective.
- In addition to medical care, establishment of a channel for dispatching and analysing the suspect articles.

- Dissemination of information to the medical and scientific community about the existence of this study protocol.

This protocol should be integrated in vigilance schemes at regional (Regional Vigilance and Support Network - RREVA) and national (ANSES, DGS) level, as well as in surveillance schemes (Departmental Directorate for the Protection of Populations - DDPP, DGCCRF).

Regarding the analysis of textiles and footwear, screening for substances should not be limited to substances subject to regulation, nor to the detection/quantification of substances with thresholds defined by regulations.

Recommendations intended for the organisations responsible for placing products on the market

The CES experts recommend that the organisations responsible for placing products on the market ensure that there are no skin sensitising or irritating substances present at levels liable to have effects on consumer health (added intentionally, or resulting from manufacturing or contamination during storage and/or shipment). In view of this, the list of substances defined in Annex 1 will serve as the basis for these analyses. If the absence of skin irritant or sensitising substances cannot be guaranteed, their presence in the articles should be reduced to a minimum and they should at the very least be mentioned on the labelling.

The CES experts encourage the organisations responsible for placing products on the market to gain a better understanding of the exact composition of their products and to provide information to physicians in the event of adverse effects. To this end, in relation to some of the cases from the biomedical study (still under investigation), it seems relevant to consider additional analyses by thermal extraction in order to identify markers or degradation products of substances added intentionally or resulting from manufacturing processes.

Recommendations intended for the analysis laboratories

The measurement standards currently in force enable certain substances known to be skin sensitisers or irritants to be screened for and quantified. However, the thresholds defined in these standards cannot always protect individuals already sensitised to a substance from elicitation. In some cases, the regulatory thresholds have been established on the basis of the analytical thresholds available when the standards were drawn up. The CES experts therefore recommend questioning laboratories about their ability to reduce the existing detection and quantification thresholds.

Recommendations for consumers

Consumers should be reminded of the importance of washing all textile clothing in contact with the skin before it is worn for the first time, by following the washing recommendations formulated by the manufacturer. An information campaign could therefore be conducted by the national players.

Recommendations for the public authorities

The CES experts underline the fact that many substances, whose use is restricted or prohibited under the REACH Regulation, are found in footwear or textile clothing. The CES therefore reiterates the importance of the controls in the textile and footwear sector to avoid the presence on the French market of articles that do not comply with the regulations, and recommends at the very least maintaining this control pressure.

The experts recommend revising the existing regulatory thresholds under the REACH Regulation, for chromium VI and nickel. They also recommend determining regulatory thresholds for the following substances: 1,4-paraphenylenediamine, 2-phenoxyethanol, cadmium, 2-mercaptobenzothiazole, aniline and drometrizole.

The CES experts recommend establishing a consumer information campaign on the importance of washing clothing before it is worn for the first time.

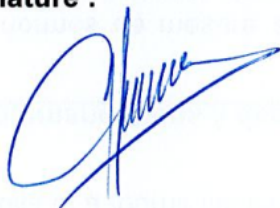
The CES experts recommend that the presence of skin sensitising substances be mentioned systematically on the packaging and/or labelling of footwear or textile clothing.

The CES experts encourage the European adoption of the restriction measure being considered at European level concerning CMR substances used in textile articles.

The CES experts recommend that the requirement to provide information on composition (including substances added intentionally, or resulting from manufacturing or contamination during storage and/or shipment) be extended to textile clothing articles and footwear, in a similar way to what is stipulated for mixtures by the toxicovigilance scheme.

**Date de validation du rapport d'expertise collective par le comité d'experts spécialisé :
21 décembre 2017**

Signature :



Maisons-Alfort, le 15/01/2018,

Au nom des experts du CES
« Évaluation des risques liés aux articles et produits de consommation »,
M Luc Belzunces
Président du CES

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NF EN ISO 105E04 : Textiles- Essais de solidité des coloris

GB 18401-2016 : National general safety technical code for textile products

12.3 Législation et réglementation

Règlement n° 528/2012 du Parlement européen et du Conseil du 22 mai 2012 concernant la mise à disposition sur le marché et l'utilisation des produits biocides

Règlement n° 1007/2011 du Parlement européen et du Conseil du 27 Septembre 2011 relatif aux dénominations des fibres textiles et à l'étiquetage et au marquage correspondants des produits textiles au regard de leur composition en fibres, et abrogeant la directive 73/44/CEE du Conseil et les directives 96/73/CE et 2008/121/CE du Parlement européen et du Conseil

Règlement n° 1907/2006 du Parlement européen et du Conseil du 18 décembre 2006 concernant l'enregistrement, l'évaluation et l'autorisation des substances chimiques, ainsi que les restrictions applicables à ces substances (REACH), instituant une agence européenne des produits chimiques

Règlement n°850/2004 du Parlement européen et du Conseil du 29 Avril 2004 concernant les polluants organiques persistants et modifiant la directive 79/117/CEE

Décret n° 96-477 du 30 mai 1996 relatif à l'étiquetage des matériaux utilisés dans les principaux éléments des articles chaussants proposés à la vente au consommateur

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Décision 2009/567/CE de la Commission du 9 juillet 2009 établissant les critères d'attribution du label écologique communautaire aux produits textiles

Décision 2009/563/CE de la Commission du 9 juillet 2009 établissant les critères d'attribution du label écologique communautaire aux articles chaussants

Directive 73/44/CE du Conseil du 23 février 1973 concernant le rapprochement des législations des Etats membres relatives à l'analyse quantitative de mélanges ternaires de fibres textiles

Directive 96/73/CE du Parlement européen et du conseil du 16 décembre 1996 relative à certaines méthodes d'analyse quantitative de mélanges binaires de fibres textiles

Directive 2008/121/CE du Parlement européen et du conseil du 14 janvier 2008 relative aux dénominations textiles

Règlement (UE) n° 344/2013 de la Commission du 4 avril 2013 modifiant les annexes II, III, V et VI du règlement (CE) n° 1223/2009 du Parlement Européen et du Conseil relatif aux produits cosmétiques restreint son utilisation

12.4 Sites internet

Blue Sign : <https://www.bluesign.com/>

Oeko-Tex : <https://www.oekotex.com>

Nordic Ecolabel : <http://www.nordic-ecolabel.org/>

GOTS : <http://www.global-standard.org/fr/>

ZDHC : <https://www.roadmaptozero.com>

ANNEXES



Annex 1: Formal request letter

2014 -SA- 0 2 3 7



COURRIER ARRIVE
12 NOV. 2014
DIRECTION GENERALE

Ministère de l'économie, de l'industrie et du numérique
Direction générale de la concurrence,
de la consommation et de la répression des fraudes

Ministère des affaires sociales, de la santé et des droits
des femmes
Direction générale de la santé

Paris, le - 6 NOV. 2014

La Directrice générale de la concurrence, de la
consommation et de la répression des fraudes

Le Directeur général de la santé

à

Monsieur le Directeur général de l'Agence nationale de
sécurité sanitaire de l'alimentation, de l'environnement
et du travail,
27-31 avenue du Général Leclerc
94701 Maisons-Alfort Cedex

Objet : Saisine relative à la sécurité des articles chaussants et textiles d'habillement¹

PJ :

- formulaire de saisine
- annexe 1 : synthèse des substances recherchées ou détectées dans les articles chaussants et textiles
- annexe 2 : bilan des analyses concernant les articles chaussants
- annexe 3 : bilan des analyses concernant les articles textiles

Veillez trouver ci-joint une saisine relative à la sécurité des articles chaussants et textiles d'habillement en matière de risque d'allergie ou d'intolérance par contact cutané.

Cette problématique, qui fait l'objet de plaintes et de signalements de consommateurs, parfois relayés par les médias, nous semble en effet mériter des approfondissements en matière d'analyse des risques, compte tenu du nombre de substances chimiques pouvant être utilisées dans la fabrication et le transport, et du danger potentiel lié à ces substances qui, pour la plupart d'entre elles, ne sont pas réglementées vis-à-vis de ce type d'usage.

L'expertise de l'ANSES est plus particulièrement souhaitée aux fins :

- d'identifier les substances chimiques irritantes ou sensibilisantes cutanées, réglementées ou non, susceptibles d'être présentes dans les articles chaussants et textiles. Nous joignons à la présente les listes des substances les plus couramment détectées par le Service commun des

¹ Les articles chaussants concernés par la saisine sont définis par le décret n°96-477 du 30 mai 1996 relatif à l'étiquetage des matériaux utilisés dans les principaux éléments des articles chaussants proposés à la vente au consommateur. Les articles d'habillement sont définis par le règlement n°1007/2001 du parlement européen et du conseil du 27 septembre 2011 relatif aux dénominations des fibres textiles et à l'étiquetage et au marquage correspondants. Ne sont pris en compte dans le cadre de la saisine que les vêtements susceptibles d'être en contact avec la peau, à l'exclusion des articles textiles d'ameublement, des articles textiles ménagers (torchons, serviettes, nappes...) et autres. Les EPI (équipements de protection individuelle) ne sont pas concernés par la saisine.

laboratoires (SCL) en matière d'articles textiles et chaussants sur la période 2012-2014 (cf. annexes 1, 2 et 3), ces listes n'ayant pas de caractère exhaustif ;

- de réaliser un état des lieux des connaissances sur les risques présentés par ces substances ;
- de formuler des recommandations en matière de fabrication et, le cas échéant, de conservation pendant le transport, en se plaçant du point de vue du consommateur final ;
- de rendre un avis sur l'opportunité de limiter l'utilisation de certaines substances identifiées ;
- de proposer une méthodologie d'investigation des cas d'allergie ou d'intolérance cutanée signalés par les médecins spécialistes, permettant d'avancer dans la connaissance des substances en cause.

Nous vous remercions de nous préciser le ou les comités d'experts spécialisés qui seront saisis du dossier.

Le rapport final sur cette saisine est attendu dans le délai de 12 mois.

La directrice générale de la DGCCRF



Nathalie HOMOBONO

Le directeur général de la santé



Benoit VALLET

Annex 2: French comments on the REACH restriction proposal (CMR substances in textiles)



Paris, 21 mars 2016

NOTE DES AUTORITÉS FRANÇAISES

Objet : Réponse des Autorités françaises à la consultation publique de la Commission sur la restriction des substances classées CMR 1A et 1B dans les textiles

PJ : Annexe 1 : Table-Sub to be added in the restriction list according FR;

Annexe 2: Table-Substances. FR agree on restrictions.

Les autorités françaises remercient la Commission pour ce projet de restriction des substances classées CMR 1A et 1B, au titre du règlement CLP, dans les textiles selon l'article 68(2) du règlement REACH.

Les autorités françaises approuvent la mise en oeuvre de la procédure de restriction définie par l'article 68(2) du règlement REACH, que le co-législateur a mise en place pour protéger les consommateurs spécifiquement vis-à-vis des articles libérant des substances CMR.

Les autorités françaises considèrent qu'il s'agit d'un moyen efficace pour protéger la population, puisque cette procédure permet de réglementer des substances dont les propriétés intrinsèques de danger sont déjà bien connues et très préoccupantes, et dont l'exposition est réelle pour le consommateur, présentant un risque bien identifié. Cette procédure est vertueuse puisqu'elle juge prioritaires les risques pour le consommateur.

Considérant le champ d'application de la proposition de restriction, les autorités françaises approuvent le fait que celui-ci se base sur la définition d'un article textile au titre du règlement européen sur le textile n° 1007/2011 (« article composé d'au moins 80% en poids de fibres textiles ou article contenant une partie composée d'au moins 80% en poids de fibres textiles »).

En particulier, le champ d'application de cette proposition de restriction exclut les jouets, excepté ceux qui contiennent au moins 80% de fibres textiles ou une partie contenant au moins 80% de fibres textiles, en accord avec la définition énoncée ci-dessus.

Les autorités françaises considèrent cependant que, parmi les exclusions du champ d'application, il convient d'ajouter les articles textiles de seconde main, réutilisés tels quels ou recyclés pour une réutilisation toute autre, qui ont déjà été libérés après plusieurs lavages toutes les substances nocives qu'ils contenaient et n'ont donc pas à être soumis à cette restriction.

Considérant les substances à inclure dans la proposition de restriction, un tableau est présent en annexe, répertoriant les substances supplémentaires à inclure dans le champ de la restriction, et un tableau de substances pour lesquelles nous confirmons l'intérêt d'une restriction, conformément au travail mené par l'agence nationale de sécurité sanitaire, de l'environnement, du travail et de l'alimentation.

Annexe 1**Public consultation on a possible restriction of hazardous substances (CMR 1A and 1B) in textile articles and clothing for consumer use under Article 68(2) of Regulation EC No 1907/2006 (REACH) – Table for responses**

	Name of substance	CAS/EC number	Chemical group	Comments on presence/absence in textile and clothing articles and in non-textile (parts of) clothing articles and accessories (including imported articles). Questions 3.1, 3.3, 3.5, 3.7, 3.8	Comments on function of the substance. Questions 3.2, 3.5	Comments on concentration limit and enforceability. Question 3.9, 3.10	Comments on socio-economic elements. Questions 3.4, 3.6, 3.11	Is the information confidential (Yes/No)?
1	Dibutyltin laurate	7758-7						No
2	Dibutyl oxide	818-08-6						
3	Triethyl phosphate							
4	Antimony trioxide	1309-64-4			Flame retardant			
5	2-methoxyethanol	109-86-4						
6	1,2-methoxyethane	110-71-4						
7	1,2-bis(2-methoxyethoxy)ethane	112-49-2						
8	Boric oxide	1303-86-2						
9	Disodium tetraborate pentahydrate	112-49-2						
10	octaBDE	32536-52-0						
11	PFOS	1763-23-1			Un-smear			
12	PFOA	335-67-1			Un-smear			

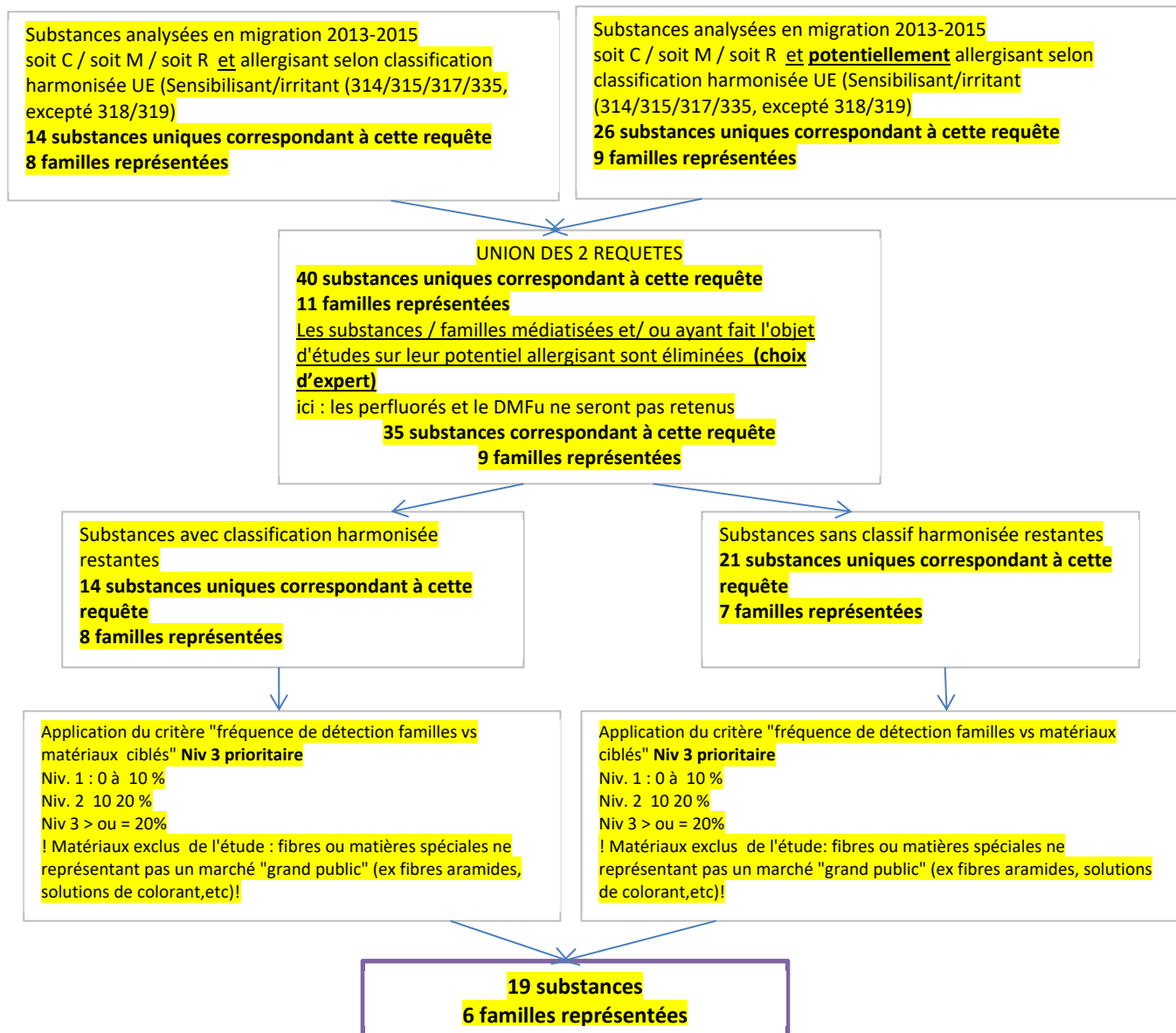
13	Tributyl phosphate	126-73-8					Flame retardant	
14	tris (2-chloro-1-(chloromethyl)ethyl) phosphate	13674-87-8					Flame retardant	
15	4-methyl-2-pentanone (methylisobutylacetone)	108-10-1					Textile coating	
16	Phenol	108-95-2					Textile coating	
17	Pentachlorophenol	87-86-5					Found in migration assays	
18	Toluene	108-88-3					Textile coating	
19	4-tertbutylphénol	98-54-4					Foam	
20	nonylphenol	25154-52-3					Found in migration assays	
21	1,2-benzenedicarboxylic acid di-C7-11-branched and linear alkylesters	68515-42-4			Listed by KEMI in 2014 in their report "chemicals in textiles". Harmonised classification : R1B			
22	1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich	71888-89-6			Listed by KEMI in 2014 in their report "chemicals in textiles". Harmonised classification : R1B			
23	1,2-Benzenedicarboxylic acid, dipentyl ester, branched and linear	84777-06-0			Listed by KEMI in 2014 in their report "chemicals in textiles". Harmonised classification : R1B			
24	6-hydroxy-1-(3-isopropoxypropyl)-	85136-74-9			Listed by KEMI in 2014 in their report "chemicals in			

Annex 3: List of substances identified by the RIVM

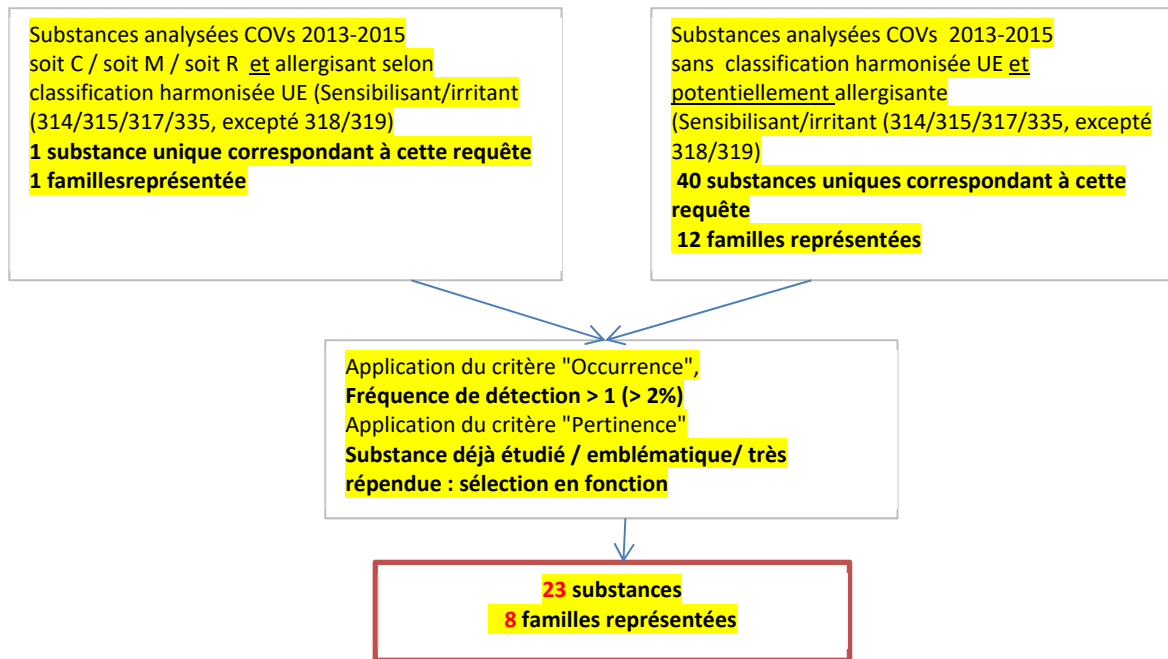
Substance	CAS number	Classification	Remarks
Dibutyltin dilaurate	77-58-7	M2 R1B STOT RE1 Skin Sens1	Restriction Annexe XVII (0.1% articles pour le consommateur)
Dibutyltin oxide	818-08-6	M2 R1B STOT RE 1 Skin Sens 1	
Zinc oxide	1314-13-2	R1A STOT RE 2	Impureté du plomb
Cobalt titanite green spinel	68186-85-6	C1A STOT RE 1Skin Sens1	Impureté du Nickel
Methanaminium, N-[4-[[4-(dimethylamino)phenyl]phenylmethylene]-2,5-cyclohexadien-1-ylidene]-N-methyl-, acetate	41272-40-6	Repr 2 Skin Sens 1	Colorant, acétate de vert malachite
tris[2-chloro-1-(chloromethyl)ethyl] phosphate	13674-87-8	C2	Retardateur de flamme TDCP
Confidentiel 1			Confidentiel
Diocetyl tin bis-(ethylmaleate)	68109-88-6	R2 STOT RE 1	Restriction Annexe XVII (0.1% articles pour le consommateur)
Diocetyl tin laurate	3648-18-8	Confidentiel	Restriction Annexe XVII (0.1% articles pour le consommateur)
Phenol, isopropylated, phosphate (3:1)	68937-41-7 5 2.08 0.04	R 2 STOTRE 2	Retardateur de flamme polyvinylique
Tris(methylphenyl) phosphate	1330-78-5	R2	Retardateur de flamme
Confidentiel 2			Confidentiel
Phthalate de Dicyclohexyle	84-61-7	Repr 2 Skin Sens 1	Plastifiant
Phthalate de diisobutyle	84-69-5	R1b	Plastifiant, Annexe XIV REACH
N,N-diethylaniline	91-66-7	STOT RE 2	Intermédiaire
Confidentiel 3			Confidentiel
2,2'-iminodiethanol	111-42-2	STOT RE 2	Utilisé dans la fabrication des colorants, additifs des textiles
Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7	R1B	Restriction Annexe XVII REACH; 0.1% jouets and article de puériculture Annexe XIV REACH Retardateur de flamme
Antimony Trioxide	1309-64-4	R1A C2 STOT RE2	
Divanadium pentaoxide 215-239-8 Muta 2 Repr 2 STOT RE 1	1314-62-1	M2 R2 STOT RE1	Intermédiaire
6 Na na Intermediate 1,1'-(1,1-dimethyl-3-methylene-1,3-propanediyl)bisbenzène	6362-80-7	Skin Sens 1 STOT RE2	-
Cobalt dichloride	7646-79-9	C 1A 1B M2 R1B Skin sens 1 STOT RE 2	Indicateur d'humidité.

Cobalt sulphate	10124-43-3	C 1A 1B M2 R1B Skin sens 1	Utilisé dans la fabrication des pigments.
Hexabromocyclododécane	25637-99-4	R2	Retardateur de flamme Annexe XIV REACH
Benzenamine, reaction products with aniline hydrochloride and nitrobenzène, hydrochlorides	101357-16-8	STOT RE 2	Confidentiel
Confidentiel 4			Confidentiel
Confidentiel 5			Confidentiel
Confidentiel 6			Confidentiel
Confidentiel 7			Confidentiel
TE_FAT40812/A_03-05-0479_IT_EC445-040-3_CAS577954-20-2_RED TZ 5271	577954-20-2	Skin Sens 1	Colorant
Confidentiel 8			Confidentiel
Tetrakis (hydroxymethyl) phosphonium chloride, oligomeric reaction products with urea (Monomer)	27104-30-9	R2 Skinsens 1	Retardateur de flamme

Annex 4: Decision tree for selecting test substances for textile clothing



Decision tree for the groups of substances to be tested by solvent extraction



Decision tree for drawing up the sampling plan for the thermal extraction tests

Annex 5: Standards followed for the analyses performed using solvent extraction on new textiles

Type of chemical group analysed	Description of the test	Technique used	Limit of quantification – LQ (mg/kg)
Colorants azoïques (amines aromatiques)	<p>La détection et le dosage de certaines amines aromatiques dérivées de colorants azoïques ont été réalisés selon les méthodes NF EN 14362-1 :04-2012.</p> <p>L'échantillon est soumis à une méthode d'extraction au moyen de chlorobenzène sous reflux et/ou une méthode de réduction (clivage réducteur des groupes azoïques à T°>60°C) avec du dithionite de sodium dans une solution aqueuse tamponnée au citrate, les méthodes utilisées est en fonction de la classe du colorant. La détection et le dosage des amines se fait par chromatographie (1 seule répétition).</p>	Chromatographie liquide haute performance (HPLC)/Chromatographie sur couche mince (CCM)	5 (pour chaque substance)
Alkylphénols éthoxylates (APEOs)	La détection et le dosage des APEO et AP s'appuie sur une méthode interne : extraction au méthanol (ultrasons, T<60°C) sur une éprouvette textile (m<5g). Le dosage des alkylphénols par chromatographie liquide (1 seule répétition)	Chromatographie en phase gazeuse et en phase liquide couplées à la spectrométrie de masse (CPG-SM et LC/MS)	20 (pour chaque substance)
Allergenic dyes	La détection et le dosage de certains colorants classés cancérogènes ou allergènes s'appuie sur une méthode interne. Ils sont réalisés par extraction Soxhlet à l'acétone (T < 60°C) sur une éprouvette textile (m < 5g). Le dosage des colorants est effectué par chromatographie liquide (1 seule répétition)	Chromatographie liquide couplée à la spectrométrie de masse (LC/MS)	5 (pour chaque substance)
Formaldehyde	Le dosage du formaldéhyde sur supports textiles a été réalisé en opérant selon la méthode NF EN ISO 14184-1 (méthode par extraction d'eau). Le formaldéhyde est extrait d'un échantillon textile dans de l'eau à 40°C. La quantité de formaldéhyde extraite est ensuite déterminée par spectrophotométrie.	Spectrophotométrie/UV-visible	16
Hydrocarbures Aromatiques Polycycliques (HAP)	Le dosage des HAP a été réalisé selon une méthode interne par extraction au toluène d'une éprouvette de masse inférieure à 5g (ultrason, T : 60°C) et détection par chromatographie (1 seule répétition)	CPG-MS	0,1 (pour chaque substance)
Extractable metals	Le dosage des métaux a été réalisé selon une méthode interne avec une extraction à la suie artificielle acide (type NF EN ISO 105E04) d'une éprouvette de masse<5g (T < 60°C) et dosage par ionisation (1 seule répétition).	ICP-MS (spectrométrie par torche à plasma)	Sb=1/As=0,1 Pb=0,1/Cd=0,05 Cr=0,1/Co=0,1 Cu=1/Ni=0,1 Hg=0,01/Se=0,1
Metals after mineralisation	Le dosage des métaux totaux a été réalisé selon une méthode interne au laboratoire par minéralisation acide (digestion) et détection par ionisation. Le solvant utilisé est un mélange d'acide nitrique et d'acide chlorydrique.	ICP-MS	

Composés organostanniques(Etain)	L'extraction et le dosage des composés organostanniques ont été réalisés selon une méthode interne au laboratoire par extraction avec un solvant organique (mélange ethanol/m éthanol, T<70°C et bains à ultrasons puis isooctane, sous agitation). L'éprouvette utilisée possède une masse < 5g. La détection est réalisée par chromatographie (1 seule répétition).	CCPG-SM	1000(pour chaque substance)
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Annex 6: Results of the tests on new textiles

Sample	Aromatic amines	APs/APEOs	Allergenic dyes	Formaldehyde	PAHs	Metals after mineralisation	Extractable metals	Organotins
1	< LQ	NPEOs (26027-38-3)=59,77 mg/kg	CI Disperse Yellow 23 (6250-23-3) = 31 mg/kg sur la ceinture (fil violet)		< LQ			< LQ
2	PPD = 13mg/kg	NPEOs (26027-38-3)=79,17mg/kg	< LQ	< LQ		Cobalt = 10mg/kg Cuivre = 2,47mg/kg Antimoine = 0,41mg/kg		< LQ
3	< LQ	NPEOs(26027-38-3) = 71,33 mg/kg						< LQ
4	< LQ	< LQ	< LQ		< LQ			
5	< LQ	NPEOs (26027-38-3)=68,67mg/kg	< LQ	< LQ	< LQ			< LQ
6	< LQ	< LQ	< LQ		< LQ			< LQ
7	< LQ		< LQ	< LQ		Chrome = 178mg/kg Nickel = 82,34mg/kg Cobalt = 28,32mg/kg Cuivre = 54,58mg/kg Arsenic = 84,18mg/kg Plomb = 0,27mg/kg		< LQ
8	< LQ	< LQ		< LQ	< LQ		< LQ	
9	< LQ	< LQ	< LQ		< LQ			< LQ

Sample	Aromatic amines	APs/APEOs	Allergenic dyes	Formaldehyde	PAHs	Metals after mineralisation	Extractable metals	Organotins
10	< LQ	< LQ					Chrome = 1,06mg/kg Nickel = 0,1mg/kg	
11	< LQ	< LQ	< LQ		< LQ		Chrome = 0,36mg/kg	
12	< LQ	< LQ			< LQ	< LQ	< LQ	< LQ
13	PPD = 38mg/kg – sur la maille enduite noire PPD = 18mg/kg – sur maille arrière fibre PES	< LQ	< LQ		< LQ			< LQ
14	< LQ	< LQ	< LQ		< LQ	Cadmium = 0,05mg/kg Chrome = 351,86mg/kg Nickel = 87,74mg/kg Cobalt = 46,76mg/kg Cuivre = 56,94mg/kg Arsenic = 36,50mg/kg Plomb = 0,52mg/kg	< LQ	< LQ
15	< LQ	< LQ	< LQ	< LQ	< LQ			< LQ
16	< LQ	NPEOs(26027-38-3) = 236,56mg/kg	< LQ		< LQ			
17	< LQ	< LQ	< LQ		< LQ		< LQ	< LQ
18	PPD = 56 mg/kg surface non enduite noire	< LQ	< LQ	< LQ	< LQ			DBTC = 0,43mgSn/kg (ou 0,96mg/kg) MBTC = 0,85mgSn/kg(1,26mg/kg)

Sample	Aromatic amines	APs/APEOs	Allergenic dyes	Formaldehyde	PAHs	Metals after mineralisation	Extractable metals	Organotins
19	< LQ	< LQ	< LQ		< LQ	Nickel = 0,1mg/kg Cuivre = 3,04mg/kg Mercure = 0,09mg/kg		
20	PPD = 36mg/kg	< LQ	< LQ	< LQ	< LQ			< LQ
21	< LQ	< LQ			< LQ		< LQ	< LQ
22	< LQ	NPEOs(26027-38-3) = 24,06mg/kg	< LQ	< LQ	< LQ		Chrome = 3,41mg/kg	
23	< LQ	< LQ	< LQ		< LQ			
24	< LQ	< LQ	< LQ		< LQ			
25	< LQ	< LQ		< LQ				

< LQ: substance screened for but not quantified

PPD = 1,4-paraphenylenediamine (106-50-3)

MBTC = Monobutyltin trichloride (1118-46-3)

DBTC = Dibutyltin dichloride (683-18-1)

Substance not screened for

Infrared analyses were carried out on some textiles when there were doubts about the composition of the textile indicated on the label.

Results of the tests on new textiles using thermal desorption

Sample	Substance	CAS No.	Results (µg/g of sample)	Sum of the compounds extracted thermally	Sampling area
1	Triacétine	102-76-1	<1 µg/g	5 µg/g	Mailles toutes couleurs/matières confondues
	Phtalate de diéthyle	64-65-2	<1 µg/g		
	Benzyl benzoate	120-51-4	<1 µg/g		
	Isopropyl myristate	110-27-0	<1 µg/g		
	Nonadécane	629-92-5	<1 µg/g		
	Palmitate de méthyle	112-39-0	<1 µg/g		
	Phtalate de dibutyle	84-74-2	<1 µg/g		
2	Benzocycloheptatriène	264-09-5	<1 µg/g	5 µg/g	Maille noire
	Benzophénone	119-61-9	<1 µg/g		
	Benzyl benzoate	120-51-4	<1 µg/g		
	Phtalate de dibutyle	84-74-2	<1 µg/g		
3	Composé aromatique		10.5	32 µg/g	Imprimé léopard (toutes couleurs/matières confondues)
	Phtalate de dibutyle	84-74-2	5.3		
	Acide n-hexadécanoïque	57-10-3	5.1		
	Composé aromatique		4.1		
	Dérivés siloxane		3.1		
	Phtalate de diisobutyle	84-69-5	21.7		
	Phtalate de dibutyle	84-74-2	26.5		
4	Phalate de diisooctyle	27554-26-3	2.1	20 µg/g	Maille (toutes couleurs/matières confondues)
	Derivé du l'acide phtalique		3.8		
	Derivé du l'acide phtalique		2.3		
	Dérivé siloxane		1.2		
	Triacétine	102-76-1	<1 µg/g		
	BHT	128-37-0	<1 µg/g		
	Phtalate de diéthyle	84-66-2	<1 µg/g		
	4-(1,1-diméthylpropyl)-phénol,	80-46-6	<1 µg/g		

Sample	Substance	CAS No.	Results (µg/g of sample)	Sum of the compounds extracted thermally	Sampling area
	3,5-di-tert-butyl-4-hydrobenzaldéhyde	1620-96-0	<1 µg/g		
	Phtalate de dibutyle	84-74-2	<1 µg/g		
	Alcane		2.8		
	Heptadécane	629-78-7	10.6		
	Alcane		13.6		
	Alcane		10.9		
	Octadécane	593-45-3	19.8	132 µg/g	Elastiques (imprimés et couleurs)
	Nonadécane	629-92-5	25		
	Derivé du cyclohexane		2.9		
	Derivé de phtalate		4.9		
	Eicosane	112-95-8	9.4		
5	Alcane		2	31 µg/g	Maille zébrée (élastique non compris)
	Alcane		4.1		
	Phtalate de diéthyle	84-66-2	4.9		
	Octadécane	593-45-3	<1 µg/g		
	2,6,10,14-tétraméthyl-Hexadécane	638-36-8	<1 µg/g		
	Isopropyl myristate	110-27-0	<1 µg/g		
	Palmitate de méthyle	112-39-0	<1 µg/g		
6	Acide acétique	64-19-7	<1 µg/g	5 µg/g	Maille (toute couleur/matière confondue)
	Phenol	108-95-2	<1 µg/g		
	Acide dodécanoïque	143-07-7	<1 µg/g		
	Acide Tétradécanoïque	544-63-8	<1 µg/g		
	Benzyl benzoate	120-51-4	<1 µg/g		
	1-Hexadécanol	36653-82-4	<1 µg/g		
	Donitrile	2437-25-4	<1 µg/g		
	Palmitate de méthyle	112-39-0	<1 µg/g		
	Acide n-hexadécanoïque	57-10-3	<1 µg/g		
	Phtalate de dibutyle	84-74-2	<1 µg/g		

Sample	Substance	CAS No.	Results (µg/g of sample)	Sum of the compounds extracted thermally	Sampling area	
7	Butylated hydroxytoluene	128-37-20	1.3	181 µg/g	Textile (pas en contact avec la peau)	
	Alcane		4.8			
	Derivé d'ester		2.9			
	Derivé d'ester		3.8			
	Phtalate de dibutyle	84-74-2	165.1			
	7	Butylated hydroxytoluene	128-37-20	5.5	105 µg/g	Mousse PU(+ fine couche textile en contact avec la peau)
		Dérivé d'ester		3.3		
		Alcane		6.3		
		Phtalate de dibutyle	84-74-2	67.1		
	8	Acide acétique	64-19-7	<1 µg/g	5 µg/g	Tissu (toutes couleurs/matières confondues)
Phtalate de diethyle		84-66-2	<1 µg/g			
9	Hexadécane	544-76-3	3.7	345 µg/g	Maille bleue et sur impression blanc.	
	Phtalate de diethyle	84-66-2	14.1			
	Alcane		6.5			
	Heptadécane	629-78-7	16.9			
	Alcane		15.9			
	Alcane		10.6			
	Alcane		6.5			
	Alcane		5.8			
	Dérivé du cyclohexane		6.6			
	Alcane		23.4			
	Alcane		25			
	Alcane		6.8			
	Alcane		4.9			
	Alcane		3.3			
	Nonadécane	629-92-5	19.8			
	Alcane		3.9			
	10	Acide acétique	64-19-7			<1 µg/g

Sample	Substance	CAS No.	Results (µg/g of sample)	Sum of the compounds extracted thermally	Sampling area
11	Phtalate de diéthyle	84-66-2	<1 µg/g	24 µg/g	Maille noire (élastique non compris)
	4-(1,1-diméthylpropyl-)phénol	80-46-6	<1 µg/g		
	3-méthylbenzophénone	643-65-2	<1 µg/g		
	Phtalate de dibutyle	84-74-2	<1 µg/g		
	Acide n- hexadécanoïque	57-10-3	<1 µg/g		
	Derivé d'amine		14.5		Tissu noir et surimpression blanche (hors élastique)
	Quinoline	91-22-5	<1 µg/g		
	Butylated hydroxytoluene	128-37-0	<1 µg/g		
	Acide dodécanoïque	140-07-7	<1 µg/g		
	Phtalate de diéthyle	84-66-6	<1 µg/g		
12	1-Bromo-3,5-dinitrobenzène	18242-39-2	<1 µg/g	229 µg/g	Maille noire
	Benzyl benzoate	120-51-4	<1 µg/g		
	Phtalate de dibutyle	84-74-2	<1 µg/g		
	Dérivé d'ester		171.7		
	Alcane		2.4		
	Alcool		5.9		
	Dérivé de l'acide cyclopentanecarboxylique		4.5		
	Dérivé siloxane		77.4		
	BHT	128-37-0	3.9		
	Dérivé de l'acide cyclopentanecarboxylique		6.9		
	Alpha méthylstyrène	98-83-9	<1 µg/g		
	Acide 2-éthylhexanoïque	149-57-5	<1 µg/g		
	Triacétine	102-76-1	<1 µg/g		
13	Cyclodécane	293-96-9	<1 µg/g	15 µg/g	Renfort silicone
	2-Naphtaléol	135-19-3	<1 µg/g		
	2,6,10,14-Tétraméthylpentadécane	1921-70-6	<1 µg/g		
	Triacétine	102-76-1	24.6		
	Composé ester – acide phtalique		2.3		
	Alcane		4.2		

Sample	Substance	CAS No.	Results (µg/g of sample)	Sum of the compounds extracted thermally	Sampling area
	Dérivé d'ester		8		
	2,4-Di-tert-butylphénol (DTBP)	96-76-4	<1 µg/g		
	Butylated hydroxytoluene	128-37-0	<1 µg/g		
	3,5-di-tert-4-hydroxybenzaldehyde	1620-98-0	<1 µg/g		
	Phtalate de dibutyle	84-74-2	<1 µg/g		
14	Phénol	108-95-2	23.5		
	Composé aromatique		1.7		
	Acide acétique	64-19-7	<1 µg/g		
	Benzocaïne	94-09-7	<1 µg/g	26 µg/g	Tissu bordeau
	Cyclohexadécane	295-65-8	<1 µg/g		
	Benzyl benzoate	120-51-4	<1 µg/g		
	Acide n-hexadécanoïque	57-10-3	<1 µg/g		
	Phénol	108-95-2	45		
	N-propyl benzèneamine	622-80-0	7.5		
	Composé aromatique		3.5		
	Benzocaïne	94-09-7	10.1		
	Phtalate de diéthyle	84-66-2	17.4	177 µg/g	Mousse
	Composé aromatique		25.6		
	Composé aromatique		3		
	Benzyl benzoate	120-51-4	17.1		
	Composé aromatique		4.3		
	Dérivé siloxane		1.2		
15	Butylated hydroxytoluene	128-37-0	<1 µg/g	5 µg/g	Tissu enduit
	Phtalate de diéthyle	84-66-2	<1 µg/g		
	Benzyl benzoate	120-51-4	<1 µg/g		
	Phtalate de dibutyle	84-74-2	<1 µg/g		
16	Phtalate de diéthyle	84-66-2	<1 µg/g		
	2-Naphtalenol	135-19-3	<1 µg/g	5 µg/g	Maille grise bleue
	Benzyl benzoate	120-51-4	<1 µg/g		

Sample	Substance	CAS No.	Results (µg/g of sample)	Sum of the compounds extracted thermally	Sampling area
17	Phénol	108-95-2	5.8	64 µg/g	Maille imprimée (toute couleur/matière confondue)
	Dérivé sulfuré ?		1.5		
	Dérivé ester		2.2		
	Alcane		2.2		
	Dérivé ester de l'acide phtalique		15.4		
	Dérivé ester		9		
	Dérivé ester		3.4		
	Dérivé siloxane		8.9		
	Phénol	108-95-2	28.2	285 µg/g	Mousse
	Dérivé amine		5.6		
	Butylated hydroxytoluene	128-37-0	4.7		
	Dibutyl phtalate	84-74-2	13.3		
	Dérivé siloxane		59.9		
	18	Phtalate de dibutyle	84-66-2	1.9	86 µg/g
Dérivé ester de l'acide phtalique		49.6			
19	Phénol	108-95-2	3.2	69 µg/g	Tissu (toute couleur/matière confondue)
	Butylated hydroxytoluene	128-37-0	18.6		
	Composé aromatique		1.6		
	Dérivé alcane		2.2		
	Dérivé alcane		3.4		
	Dérivé alcane		6.6		
	Dérivé siloxane		5.4		
	Dérivé siloxane		6.7		
20	Benzyl benzoate	120-51-4	5.7	33 µg/g	Maille filet noire seule
	Dérivé siloxane		6.8		
	Dérivé siloxane		14.9		
	Butylated hydroxytoluene	128-37-0	1.5	292 µg/g	Maille filet noire + flocage rouge
	Dérivé siloxane		32.3		

Sample	Substance	CAS No.	Results (µg/g of sample)	Sum of the compounds extracted thermally	Sampling area
	Dérivé siloxane		77.2		
	Alcane		4		
	Dodécane	112-40-3	3.5		
	Alcane		7.6		
	Dérivé siloxane		75.5		
	Alcane		4.6		
	Alcane		3.4		
	Dérivé siloxane		48		
	Dérivé amine		6.4		
	Dérivé siloxane		2.1		
	Butylated hydroxytoluene	128-37-0	3.1		
	Dérivé siloxane		28		
	Dérivé siloxane		75.4		
	Alcane		2.6		
	Alcane		2.8	330 µg/g	Maille filet noire + flocage bleu
	Alcane		8.7		
	Alcane		7		
	Dérivé siloxane		84.1		
	Alcane		6		
	Alcane		4.3		
	Dérivé siloxane		57.6		
21	Acide acétique	64-19-7	4.5		
	Ester ?		20.3		
	Dérivé siloxane		51.9		
	2-éthylhexyl octanoate	63321-70-0	30.5		
	Octadécane	593-45-3	76.1	1000 µg/g	Maille
	Alcane		25.1		
	Dérivé siloxane		148.9		
	Nonadécane	629-92-5	88.6		

Sample	Substance	CAS No.	Results (µg/g of sample)	Sum of the compounds extracted thermally	Sampling area
22	Acide décanoïque, 2-éthylhexyldécanoate	73974-30-5	134.3	118330 µg/g	Maille grise (toute couleur/matière confondue)
	Dérivé siloxane		342.9		
	1,2-éthanediol	107-21-1	30.3		
	Dérivé ester		3.8		
	Dérivé ester		5.3		
	Alcane		4.9		
	Alcane		4.9		
	Dérivé ester		10.8		
	Dérivé siloxane		8.5		
	Composé aromatique		6.3		
	Siloxane ou dérivé aromatique		2.6		
	1-tridécène	2437-56-1	<1 µg/g		
	2-(dodécyloxy)-éthanol,	4536-30-5	<1 µg/g		
	Méthyl palmitate	112-39-0	<1 µg/g		
	23	1,2-éthanediol	107-21-1		
Dérivé siloxane			1.6		
Butylated hydroxytoluene		128-37-0	<1 µg/g		
Dioxyde de soufre		05/09/7446	22		
Composé aromatique			5.5		
Dérivé ester			3.1		
Composé aromatique			2.2		
Dérivé ester			2.8		
Acide n-hexadécanoïque		57-10-3	172.3		
Dérivé amine ?			3.1		
Dérivé ester		16.3			
24	Composé aromatique		15.2	258 µg/g	Textile noir (élastique non compris)
	Alcane		10.1		
	Méthyl palmitate	112-39-0	155.5		
	Heptasiloxane, hexadecaméthyl-	541-01-5	54.7		

Sample	Substance	CAS No.	Results (µg/g of sample)	Sum of the compounds extracted thermally	Sampling area
25	Dérivé ester de l'acide phtalique		2.5		
	Alcane		3	38 µg/g	Maille imprimée (élastique non compris)
	Pentadécanoate de méthyle	5129-60-2	12.5		

Annex 7: Standards used in the analysis of the composition of the footwear

	CAS number	Analytical method	Type of extraction	Analytical equipment used	Standard followed
Chromium VI		quantitatif			suivant CTC-C-CG-01 Selon EN ISO 17075
Formaldehyde	50-00-0				suivant CTC-C-MPO-32 Basé EN ISO 17226-1 (cuir) suivant EN ISO 14184-1 (textile)
Allergenic dyes					suivant DIN 54321
DMFu	624-49-7				CTC-C-MPO-12 selon GEN ISO TS 16186
Nickel	7440-02-0				EN 1811
Métaux lourds (Co, Cd, Cr total, Pb)					EN ISO 17072-2
Aromatic amines		quantitatif			En 17234-1 pour le cuir et EN 14362-1 pour le textile
NMP	872-50-4	quantitatif			EN ISO 19070
2-Hydroxyméthyle méthacrylate ⁴¹	868-77-9	qualitatif	US-acétone	GC-MS	
Alcool benzylique	100-51-6	qualitatif	US-acétone	GC-MS	
2-Méthyl-4-isothiazolin-3-one/MIT	2682-20-4	qualitatif	US-acétone	GC-MS	
Para-tert-butylphénol	98-54-4	qualitatif	US-acétone	GC-MS	

⁴¹ Marqueurs d'utilisation des colles base acrylates

	CAS number	Analytical method	Type of extraction	Analytical equipment used	Standard followed
5-Chloro-2-méthyl-4- isothiazolin-3-one/CMIT	26172-55-4	qualitatif	US-acétone	GC-MS	
Résorcinol	108-46-3	qualitatif	US-acétone	GC-MS	
4-chloro-3-méthylphénol	59-50-7	quantitatif	US - acetonitrile	HPLC-DAD	suivant EN 13365
Ethylene-glycol diméthacrylate ⁴¹	97-90-5	qualitatif	US-acétone	GC-MS	
Anhydride phtalique	85-44-9	qualitatif	US-acétone	GC-MS	
2,6-Toluène diisocyanate (*)	584-84-9	qualitatif	US-acétone	GC-MS	
2,4-Toluène diisocyanate (*)	91-08-7	qualitatif	US-acétone	GC-MS	
2-phenoxyethanol	122-99-6	qualitatif	US-acétone	GC-MS	
4-Terbutylcatéchol	98-29-3	qualitatif	US-acétone	GC-MS	
Orthophénylphénol (OPP)	90-43-7	quantitatif	US - acetonitrile	HPLC-DAD	suivant EN 13365
1-Dodécanthiol	112-55-0	qualitatif	US-acétone	GC-MS	
1,2-Benzisothiazol-3(2H)-one/BIT	2634-33-5	qualitatif	US-acétone	GC-MS	
Isophorone diisocyanate (*)	4098-71-9	qualitatif	US-acétone	GC-MS	
Benzyl benzoate	120-51-4	quantitatif	US-acétone	GC-MS/MS	
1,3-Dibutyl-2-thiourée	109-46-6	qualitatif	US-acétone	GC-MS	
2-Octylisothiazol-3(2H)-one/OIT	26530-20-1	quantitatif	US - acetonitrile	HPLC-DAD	suivant EN 13365
Hydroquinone monobenzyl ether	103-16-2	qualitatif	US-acétone	GC-MS	
2-mercaptobenzothiazole	149-30-4	quantitatif	US - acetonitrile	HPLC-DAD	
Drometrizole	2440-22-4	quantitatif	US-acétone	GC-MS/MS	
4-Aminoazobenzène	60-09-3	quantitatif	US-acétone	GC-MS/MS	

	CAS number	Analytical method	Type of extraction	Analytical equipment used	Standard followed
4,4'-diisocyanate diphenylmethane (*)	101-68-8	qualitatif	US-acétone	GC-MS	
2-(thiocyanomethylthio)-benzothiazole (TCMTB)	21564-17-0	quantitatif	US - acetonitrile	HPLC-DAD	suivant EN 13365
Bisphénol A	80-05-7	quantitatif	US - méthanol	HPLC-FLD	
Triphénylphosphate	1330-78-5	qualitatif	US-acétone	GC-MS	
Tricrésylphosphate	115-86-6	qualitatif	US-acétone	GC-MS	
Méthyl dehydroabiétate [†]	1235-74-1	qualitatif	US-acétone	GC-MS	
Méthyl abiétate [†]	127-25-3	qualitatif	US-acétone	GC-MS	
Acide palustrique [†]	1945-53-5	qualitatif	US-acétone	GC-MS	
Acide dehydroabiétique [†]	1740-19-8	qualitatif	US-acétone	GC-MS	
Acide abiétique [†]	514-10-3	qualitatif	US-acétone	GC-MS	
Glutaraldéhyde	11-30-8	qualitatif	US-acétonitrile	HPLC-DAD	Derivation DNPH
Acétophenone azine	729-43-1	qualitatif	US-acétone	GC-MS	
Paraphénylène diamine	106-50-3	quantitatif	US - méthanol	HPLC-DAD	
Benzothiazole	95-16-9	quantitatif	US-acétone	GC-MS/MS	
Hydroxytoluène butylé (BHT)	128-37-0	quantitatif			
Thiurames	/	Méthode en cours de développement			
Parabènes (éthyl, méthyl, propyl)	:	Qualitatif	US-acétone	GC-MS	

Annex 8: Summary of the toxicological data

Substances prioritised in footwear

Substances prioritised in footwear (CAS No.)	Uses	Harmonised self-classification REACH restriction	Physico-chemical properties				Toxicological properties					Sources	
			Molar mass (g.mol ⁻¹)	Boiling point/ Melting point (°C)	Density/ Vapour pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
Formaldéhyde (50-00-0)	Agent de tannage du cuir	Acute Tox 3 (skin, oral, inh) Skin Sens 1 Skin Corr 1B Muta 2 Carc 1B	30.026	-19,1 / -92	1,03 à 1,06 / 440 kPa à 20 °C ; 516-519 kPa à 25 °C	0,35 à 25°C / Très soluble dans l'eau (400-500 g.L ⁻¹) ; Soluble dans les solvants organiques	Rétention par voies cutanée, orale et inhalée Métabolisé par formaldéhyde déshydrogénase et glutathion Formation adduits ADN-protéines	Corrosif cutané	Sensibilisant cutané	Irritation sensorielle et tissulaire de la sphère ORL par voie respiratoire Irritation cutanée	Par voie inhalée, cancérogène chez l'Homme (nasopharynx) Génotoxique <i>in vitro</i> à concentrations élevées (mutagène) Formation d'adduits à l'ADN (clastogène) Pas d'effets reprotoxiques	Non suspecté PE	Anses 2017
2-Phénoxyéthanol (122-99-6)	Solvant dans la teinture ou le finissage	Acute Tox 4 (oral) Eye Irrit 2	138.16	245 / 14	1,1 / 0,01 à 0,04 hPa à 20 °C	1,13 à 1,16 / modérément soluble dans l'eau (2,7 g/100 mL à 20 °C), très soluble dans solvants	Bien absorbé par voie orale et cutanée Métabolisé en acide 2-phénoxyacétique Éliminé essentiellement dans l'urine	Pas irritant pour la peau, provoque une irritation oculaire réversible	pas sensibilisant pour la peau	Irritation légère après exposition répétée par voie cutanée	pas de potentiel génotoxique pas de donnée disponible en cancéro. Toxique pour le développement à des doses toxiques pour les mères ; il n'induit pas	Non suspecté PE	fiche INRS 269 (2008)

Substances prioritised in footwear (CAS No.)	Uses	Harmonised self-classification REACh restriction	Physico-chemical properties				Toxicological properties						Sources	
			Molar mass (g.mol ⁻¹)	Boiling point/ Melting point (°C)	Density/ Vapour pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR	ED		
													de tératogenèse	
Para-tert-butylphénol ou tert-butyl-4 phénol (98-54-4)	Anti oxydant	Repr 2 Skin irrit 2 Eye Dam 1	150.22	238,3 à 101 kPa / 99,2 à 101.325 kPa	0.38 g/cm ³ à 22 °C / 0.5 Pa à 20 °C	3 à 23 °C and pH 5.7 / 607.2 mg/L à 25 °C	Absorbé à 100% par inhalation, voies cutanée et orale Pas de potentiel d'accumulation Biotransformation par glucuronidation et sulfatation Elimination par voie urinaire et fèces	irritant pour la peau, les yeux et le système respiratoire	Résultats négatif dans test de maximisation chez l'animal mais possiblement sensibilisant chez l'homme car patch-tests positifs	Aucune donnée par voie cutanée et respiratoire	Possiblement génotoxique, chez le rat effet promoteur sur les tumeurs de l'estomac pas d'évidence de cancérogenèse chez les travailleurs et similarité de structure avec le BHA potentiellement cancérogène, pas d'effet sur la reproduction/développement	famille des alkyl phenols, suspecté PE	fiche INERIS (2014), OECD SIDS 2000, rapport expertise collective Anses saisine n°2009-SA-331, Novembre 2015, RAR NO 2008; https://echa.europa.eu	
Drométrizole ou 2-(2H-Benzotriazol-2-yl)-p-crésol (2440-22-4)	Agent anti UV	Skin sens 1B	225.25	aucune donnée / 129 - 131	1.385 g/cm ³ à 20 °C / 1.46 × 10 ⁻⁵ Pa (20°C)	4.20 (25°C, pH=6.3) / 0.173 mg/l (20°C)	Absorption complète orale (94%) Distribution en grande quantité dans foie et	Non irritant	Cas d'allergies signalés suite aux ports de vêtements.	Aucune donnée par voie cutanée et respiratoire	Non mutagène, non cancérogène, pas d'effet sur la fertilité	Non suspecté PE	Sev report 2017 (Czh), https://ec	

Substances prioritised in footwear (CAS No.)	Uses	Harmonised self-classification REACH restriction	Physico-chemical properties				Toxicological properties					Sources	
			Molar mass (g.mol ⁻¹)	Boiling point/ Melting point (°C)	Density/ Vapour pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
							reins Pas de potentiel d'accumulation Excrétion urinaire (69%), par les fèces (25%) de forme inchangée majoritaire (98%)		Chez l'animal test de maiximisation positif, LLNA positif		ni sur le développment.		ha.europa.eu
Drométrizole trisiloxane (155633-54-8)	Agent anti UV	-	501.84	530/aucune donnée	1,1 g/cm3	Aucune donnée	Aucune donnée					TOXNET US EPA IRIS ATSDR INRS ECHA OEHHA	

Substances prioritised in footwear (CAS No.)	Uses	Harmonised self-classification REACH restriction	Physico-chemical properties				Toxicological properties					Sources	
			Molar mass (g.mol ⁻¹)	Boiling point/ Melting point (°C)	Density/ Vapour pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
Chromium VI	Formation non intentionnelle par oxydation des sels de chrome III utilisés comme agent de tannage du cuir	Selon les composés Carc 1A Carc 1B Muta 1B Repr 1B Repr 2 Skin Sens 1 Skin Irrit 2 Acute Tox 3 Restriction dans le cuir à 3 mg/kg	Dépendant des composés du chrome				Absorption cutanée limitée Réduction en Cr ³⁺ par glutathion Accumulation	Corrosif cutané après exposition répétée à fortes concentrations Irritant cutané modéré à faibles concentrations	Sensibilisant cutané : 20 000 - 50 000 nouveaux cas d'allergies en Europe par an (45% provenant d'une exposition par le cuir)	Irritant et corrosif cutané et respiratoire chez des professionnels exposés de façon répétée Toxicité rénale observée aux mêmes niveaux de concentrations en milieu professionnel	Mutagène <i>in vitro</i> et <i>in vivo</i> Effets cancérogènes pulmonaires chez l'animal, suspecté chez l'Homme Par voie orale, effets foetotoxiques observés chez le rongeur en l'absence de toxicité maternelle	Non suspecté PE	Restriction ECHA 2012

Substances prioritised in footwear (CAS No.)	Uses	Harmonised self-classification REACh restriction	Physico-chemical properties				Toxicological properties					Sources	
			Molar mass (g.mol ⁻¹)	Boiling point/ Melting point (°C)	Density/ Vapour pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
Ortho-phénylphénol (OPP) (90-43-7)	Biocide	Skin Irrit 2 Eye irrit 2 Stot SE 3	170.21	286 à 1013 hPA / 59	non précisé /100 à 133 à 100°C	3,3 / 0,7 g/L à 25°C soluble dans l'eau	Absorption rapide par voie cutanée et orale . Distribution rapide dans tissu adipeux, intestin, foie, reins, sang, vessie Métabolisme par oxydation et conjugaison Pas de bioaccumulation Excrétion rapide majoritairement par les urines (90%). Demi-vie élimination chez l'Homme de 0,8 heure	Irritant pour la peau, les yeux et les muqueuses	les phenols n'ont pas de potentiel sensibilisation	Aucune donnée par voie cutanée et respiratoire	potentiel génotoxique vivo du aux métabolites. tumeurs du foie chez la souris, non génotoxique, tumeurs de la vessie chez le rat, non génotoxique. reproduction: diminution du pc des générations F1 et F2 rat. Developpement prenatal: effets foetotoxiques (type malformations ou resorptions foetales) chez le rat et résorptions foetales chez la lapine.	Identifié PE 2 in vitro. faible affinité de l'OPP pour les récepteurs aux œstrogènes humains et potentiel des cellules de mammifères limité. Conc en OPP nécessaires pour produire une réponse 10 ⁶ à 10 ⁷ fois supérieure à celles de 17 beta oestradiol	Rapport expertise collective Anses saisine n°2009-0331 avril 2012

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Butylhydroxytoluène (BHT) (128-37-0)	Anti oxydant	<i>Acute tox 4</i>	220.35	265 / 83.01 à 101.3 kPa	1.048 à 20 °C / 0.39 Pa à 24.85 °C	5,2 / 600 µg/L à 25 °C	Rapidement absorbé par voie orale mais peu absorbé (< 4%) par voie cutanée Distribué dans l'organisme (foie et graisse) Potentiellement accumulable dans les tissus Métabolisme complexe, réactions d'oxydation observées Elimination par voie urinaire et par voie fécale	Potentielle ment faible chez le lapin	Test épicutané positif chez certains patients	Aucune donnée par voie cutanée et respiratoire	Pas de mutations, ni d'aberrations chromosomiques ou de dommages et/ou d'interactions à l'ADN <i>in vitro/vivo</i> ; <i>Classé Groupe 3 par le CIRC</i>	Suspecté PE, Retards de croissance et sur le développement chez les petits du rat, effets sur la thyroïde, effets sur le foie et induction enzymatique chez le rat	https://echa.europa.eu

Substances prioritised in footwear (CAS No.)	Uses	Harmonised self-classification REACH restriction	Physico-chemical properties				Toxicological properties					Sources	
			Molar mass (g.mol ⁻¹)	Boiling point/ Melting point (°C)	Density/ Vapour pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
2-mercaptobenzothiazole (MBT) (149-30-4)	Lié au caoutchouc	Acute tox 4 Skin Sens 1	167.25	301,8 / 180 - 182	1.42 g/cm ³ à 20 °C / 0 - 0.006 Pa à 25 °C	2.42 - 2.86 à pH 7 / 51 - 900 mg/L à 25 °C and pH 5 - 9	Absorption percutanée chez le rat et chez le cobaye Distribution dans le sang et tissu Métabolisme par glucuronidation, sulfatation. Métabolites : acide mercapturique, sulfate et disulfure de dibenzothiazyl dans l'urine Excrété principalement par les urines après voie orale chez le rat et le cobaye	Pas irritant pour la peau et pour les yeux	LLNA, test de maximisation et de Buehler positifs. Sensibilisant cutané modéré. Chez l'Homme, études épidémiologiques disponibles et réactions positives aux patch-test avec dermatites de contact eczémateuse (fréquence 0,3 - 3% chez les patients diagnostiqués aux patch-tests), allergies aux port de gants chez le travailleurs.	Aucune donnée par voie cutanée et respiratoire	Pas de potentiel génotoxique vitro/vivo, pas cancéro, pas reprotoxique/ pas tératogène	Non suspecté PE	Sev report 2014, https://echa.europa.eu

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Benzyl benzoate (120-51-4)	Plastifiant /solvant pour colorant/ biocide et interdit	Acute tox 4	212.25	323.5 / 21	1.112 à 25 °C / 0.031 Pa à 25 °C	3.97 à 25 °C / 14.1 - 15.9 mg/L à 20 °C et pH 4.5	Bien absorbé par voie orale et par voie cutanée Métabolise en acide benzoïque et alcool benzylique. L'alcool benzylique, après oxydation, se transforme en acide benzoïque Elimination dans les urines après conjugaison à une glycine	Irritant chez l'Homme à une concentration de 20% (m/m) dans une lotion	Test de maximisation chez le cobaye : Potentiel sensibilisation faible LLNA chez la souris : Pas de potentiel sensibilisant ou potentiel faible Données chez l'homme: Test épicutané positif dans de rare cas	Par voie cutanée chez l'animal, hyperplasie épithéliale, dégénérescence des follicules pileux et des glandes sébacées. Effets systémiques (thyrotoxicité, variations des paramètres sanguins)	Pas de génotoxicité <i>in vitro</i> avéré (test Ames négatif), pas de données pour la cancérogénicité	Suspecté PE, Activité oestrogénique <i>in vitro</i> . La transposition des données à l'homme ne semble pas possible.	https://echa.europa.eu
Nickel (7440-02-0)	Revêtement métallique Colorants métallifères	Skin Sens 1 Carc 2 STOT RE 1 Sels solubles de nickel Repro 1B Restriction : 0,5 µg/cm ² /semaine	Dépendant des composés du nickel				Absorption négligeable par voie cutanée mais dépend de la solubilité du composé Biodisponibilité variable selon la solubilité du composé	Irritation cutanée par les sels de nickel	Sensibilisation cutanée démontrée chez l'Homme Peu de données sur la sensibilisation par voie respiratoire	Irritation cutanée par exposition répétée à des solutions de sulfate et dichlorure de nickel > 20%	Clastogène et adduits <i>in vitro</i> et <i>in vivo</i> Pas d'effet mutagène Effets cancérogènes peu possibles par voie respiratoire (résultats chez l'Homme et l'animal discutables) Sels solubles de nickel reprotoxiques chez l'animal	Non suspecté PE	ECHA proposal Oct. 2017

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			Molar mass (g.mol ⁻¹)	Boiling point/ Melting point (°C)	Density/ Vapour pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
4-chloro-3-méthylphénol ou chlorocresol (59-50-7)	Biocide (cuir)	Acute tox 4 Eye dam 1 Skin sens1	142.59	170,9 à 97,5 kPa / 98,2 à 97,5 kPa	0.709 g/cm ³ à 30 °C / 8 à 20°C	0.477 à 30 °C and pH 5.03 / soluble dans l'eau 4 g/L à 30 °C and pH 5.03	Absorbé par inhalation par voie cutanée et orale	corrosif pour la peau (étude lapin), irritant pour les yeux	LLNA et GPMT positifs, patch-tests positifs chez nombreux patients en clinique, sensibilisant	Par voie respiratoire chez l'animal, irritation des voies aériennes supérieures (œdèmes, détresse respiratoire) pouvant persister 2 semaines après l'arrêt de l'exposition	pas de potentiel mutagène, pas de données en cancéro et sur la reproduction/développement	Potentiell ement PE	Rac opinion 2016, rapport expertise collective Anses saine 2009-0331, nov 2015; fiche INERIS 2011; https://echa.europa.eu
Colophane (ou rosine) (8050-09-7)	Agent tackifiant dans les colles	Skin sens 1	1206	aucune donnée / 31 - 300 à 101,3 kPa	1.111 - 1.16 g/cm ³ à 20 - 24 °C / 0 - 10 800 Pa à 20 - 200 °C	0.74 - 7.7 à 20 - 40 °C and pH 2 - 7.72 / 900 - 438 000 µg/L à 20 °C and pH 5.39 - 9	Absorption facilitée par ses propriétés physico-chimiques	non irritant pour la peau et les yeux	sensibilisant avec dermatoses provoquées par multiples allergènes du collophane; patch-tests positifs	Aucune donnée par voie cutanée et respiratoire	non mutagène, non cancérogène, reproduction: diminution des sites implantatoires et réduction d'ela taille des mères, développement: diminution du pc des petits et de la taille des portées en présence de toxicité maternelle	Non suspecté PE	https://echa.europa.eu ; fiche INRS (2002) sur les colophanes IRIS US EPA

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			Molar mass (g.mol ⁻¹)	Boiling point/ Melting point (°C)	Density/ Vapour pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
Alcool benzylique (100-51-6)	Solvant dans les teintures ou le finissage	Acute tox 4 (inhalation et ingestion)	108	205,31 à 101,325 kPa / -15.4	1.02 - 1.06 g/cm ³ à 0 - 60 °C / 7 - 63 Pa à 20 - 45 °C	0.87 - 1.1 à 20 - 25 °C / -	Pas de potentiel d'accumulation Éliminé rapidement	non irritant pour le peau, mais irritant pour les yeux	non sensibilisant	Aucune donnée par voie cutanée et respiratoire	non mutagène, non cancérogène, pas d'effet ni sur la fertilité/reproduction ni sur le développement	Non suspecté PE	https://echa.europa.eu IRIS US EPA
1-Dodécanthiol (112-55-0)	inhibiteur de polymérisation des colles néoprène	Skin sens 1 Eye irrit 2 Eye dam 1	58	moins 9 à -7 à 101,325 kPa / 266 à 285	is 0.85 g/cm ³ à 20°C / 1.2 Pa à 25°C	6,5 / 5.4 µg/L à 20°C	Pas de données mais famille des thiols : métabolisation par S-oxydation	corrosif pour la peau et les yeux	sensibilisant (LLNA positif)	Par voie respiratoire chez l'animal, irritation cutanée et des voies aériennes	non génotoxique vitro/vivo; pas de données cancéro mais si pas mutagène hypothèse de ne pas induire potentiellement des hyperplasies ou des lésions pre-neoplasiques	Non suspecté PE	https://echa.europa.eu TOXNET

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			Molar mass (g.mol ⁻¹)	Boiling point/ Melting point (°C)	Density/ Vapour pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
Triphényl-phosphate (115-86-6)	plastifiant pour les laques/vernis/enduction	Repr 2	326,288	413-414°C / 49°C to 52°C à 101.3 kPa	1.21 à 50 °C / 0.001 Pa à 25 °C	4.6 à 20 °C / 1.9-2.1 mg/L at 25°C	2 études <i>in vitro</i> : hydrolyse du TPP en son produit de dégradation DPHP dans le foie de rat et TPP métabolisé en DPHP et en TPP mono et di-hydroxylé	non irritant	non sensibilisant	Pas d'effets observés chez l'Homme (exposition professionnelle > 10 ans)	pas de potentiel génotoxique. Pas de données cancéro Données développement : obésogène	Potentiell ement PE via activité ERα / ERβ, AR, GR, and PXR; TPP, and ses métabolite DPHP, agit comme PE sur la régulation de la différenciation adipogénique et la lipolyse	RMOA SNPE 2017 FR; https://echa.europa.eu/TOXNET

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			Molar mass (g.mol ⁻¹)	Boiling point/ Melting point (°C)	Density/ Vapour pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
Méthyl Parabène ou méthyl-4-hydroxybenzoate (99-76-3)	Conservateur (intermédiaire de synthèse)	<i>Eye irrit 2</i> <i>Skin irrit 2</i> <i>STOT SE 3</i>	152	125 °C / bp 270-280°C (dec.)	1.38 g/cm ³ à 20°C / 2.8× 10 ⁻⁵ Pa à 20°C 5.5× 10 ⁻⁵ Pa à 25°C 1.1× 10 ⁻³ Pa à 50 °C	95.5 à pH 7,5 / 1.88 g/L dans l'eau à 20°C pH 5,72 et soluble dans solvants organiques	Rapidement et facilement absorbé par voie orale, absorption cutanée plus efficace chez rat que chez l'homme Retrouvé dans lait maternel et sang de cordon Hydrolyse en acide hydroxybenzoïque, par les estérases présentes dans foie, peau, muqueuses digestive et respiratoire Excrété par sulfo- / glucurono-conjugaison ou conjugaison à la glycine principalement dans les urines	non irritant pour la peau, légèrement irritant pour les yeux	non sensibilisant	Par voie cutanée chez l'animal, irritation cutanée persistante (érythèmes, œdèmes modérés, desquamation)	non mutagène vivo/vivo, négatif dans le test vivo de dominance létale chez le rat, pas de potentiel cancérigène, pas d'effets sur la reproduction et le développement	Suspecté PE enviro	https://echa.europa.eu ; SEV decision 2016; fiche INRS 2013 TOXNET

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			Molar mass (g.mol ⁻¹)	Boiling point/ Melting point (°C)	Density/ Vapour pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
Ethyl Parabène ou éthyl-4-hydroxybenzoate (120-47-8)	Conservateur	Asp Tox 1 Skin Irrit 2 Skin Sens 1 Eye Irrit 2 STOT SE 3	166	116 °C / 297-298 °C (decomposition)	1.291 g/cm ³ à 20°C / 2.8× 10 ⁻⁵ Pa à 20°C ; 5.5× 10 ⁻⁵ Pa à 25°C ; 1.1× 10 ⁻³ Pa à 50°C	1.59 / 885 mg/L dans l'eau à 25°C	Bien absorbé Éliminé rapidement dans les urines : p-hydroxyhippuric acid et p-hydroxybenzoic acid, glucuronide et p-carboxyphenyl sulfate Pas de potentiel d'accumulation dans les tissus	non irritant pour la peau et pour les yeux	sensibilisant dans le test de maximisation	Aucune donnée par voie cutanée et respiratoire	non mutagène vitro/vivo. Pas de potentiel cancérigène par lecture croisée avec le méthyl parabène, par lecture croisée avec le propyl parabène. Pas d'effet sur la toxicité maternelle et sur le développement des petits	Suspecté PE enviro	https://echa.europa.eu TOXNET

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Propyl Parabène ou propyl-4-hydroxybenzoate (94-13-3)	Conservateur	<i>Skin Irrit 2</i> <i>Eye Irrit 2</i> <i>Eye Dam 1</i> <i>STOT SE 3</i>	180	96-97 °C / 301 °C	1.287 g/cm ³ à 20°C / 3.4× 10 ⁻⁴ Pa à 20°C ; 8.2× 10 ⁻⁴ Pa à 25°C; 4.6× 10 ⁻² Pa à 50°C	2.876 / 579.6 mg/L dans l'eau à 25°C	Absorbé très rapidement Métabolites acide p hydroxybenzoïque et glucuronide et -hydroxyhippuric acid Hydrolyse par des estérases espèces spécifiques Pas de potentiel de bioaccumulation Éliminé très rapidement dans les urines	non irritant pour la peau et les yeux	non sensibilisant (LLNA positif)	Aucune donnée par voie cutanée et respiratoire	non mutagène vitro/ vivo par lecture croisée avec le méthyl parabène. Pas cancérigène chez le rat et la souris, hyperplasies de l'estomac et de la vessie observés chez le hamster. Reproduction : légère diminution du gain de pc des rats mâles; sur le développement, lecture croisée avec l'éthyl parabène	Suspecté PE enviro	https://echa.europa.eu/TOXNET

Substances prioritised in textile clothing



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			Molar mass (g.mol ⁻¹)	Boiling point/ Melting point (°C)	Density/Vapor pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED

Aniline (62-53-3)	Colorants acides	Acute tox 3 Eye Dam 1 Skin sens 1 Muta 2 Carc 2 STOT RE 1	74.08	184.4 à 101.3 kPa / -6.2	1.022 à 20 °C / 40 Pa à 20 °C	0.91 à 25 °C and pH 7.5 / 35 g/L à 20 °C	Bien absorbée par voie orale, cutanée et par inhalation. Absorption cutanée humaine 38% Distribution large dans les tissus (globules rouges> plasma> rate> reins> poumons> cœur>cerveau et graisse) Accumulation dans rate Métabolisée dans le foie par des CYP 450 et par méthémoglobin émie Elimination dans les urines sous forme conjuguée	faiblement irritant chez le lapin	Sensibilisa nte chez le cobaye. Test épicutané positif chez patients souffrant de dermatite eczémateu se. Réactivité croisée aux substances du para- substitué groupe composé. Classé sensibilisan t	Chez l'Homme, risques de méthémoglobin émie. Si > 20- 50% de méthémoglobin e, apparition de dyspnées, tachycardie, céphalées et troubles de la conscience Personnes avec une déficience en G6PD plus à risque d'hémolyse suite à une exposition à l'aniline (population vulnérable) Chez l'animal, par voie orale, hyperplasie et fibrose de la rate, considérées comme des lésions précancéreuse s du sarcome splénique	Mutagène uniquement aux fortes doses ; in vivo, induction à forte dose, des micronoyaux et des cassures de l'ADN Carcinomes spléniques chez les rats mâle Augmentation incidences tumeurs de la vessie chez le travailleur Pas d'effets sur la fertilité chez l'Homme. Effets sur ovaires et uterus chez l'animal. Transfert placentaire rapide chez le rat. Pas d'effets developpeme nt	Non suspecté PE	ECB 2004 Fiche INRS 19 (2010) TOXNET
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			Molar mass (g.mol ⁻¹)	Boiling point/ Melting point (°C)	Density/Vapor pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
Paraphénylène diamine (PPD) (106-50-3)	Amine aromatique (colorants azoïques)	Acute Tox 3 Eye Irrit 2 Skin Sens 1	108.14	267 / 142	726 g/L à 22°C / 0,01 Pa à 20 °C	moins 0,839 / modérément soluble dans l'eau froide (31 g/l à 20 °C, pH 9.55 - 9.61)	Absorbée par toutes les voies d'administration Largement distribuée dans tout l'organisme Métabolisée principalement sous forme de dérivés N-acétylés Excrétés dans les urines	irritation modérée de la peau et des yeux en cas d'exposition unique	Sensibilisant puissant (eczémas de contact, rares réactions anaphylactiques)	Chez l'Homme, asthme allergique, irritation du larynx et du pharynx	Le CIRC l'a classé dans le groupe 3 des agents inclassables quant à leur cancérogénicité pour l'Homme. Pas d'effet connu sur le développement mais une seule espèce a été testée ; la fertilité n'a pas été étudiée.	non suspecté PE	https://echa.europa.eu ; fiche INRS 2006

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3,3'-Diméthoxybenzidine (119-90-4)	Aromatic amines (azo dyes)	Acute tox 4 Carc 1B	244,30 g/mol	non spécifié / 135 à 139	8.8 × 10 ⁻⁹ mm Hg at 25 °C,	1.81 / insoluble dans eau	Absorption principalement par voie cutanée Rapidement distribué dans le foie : cycle enterohépatique et métabolisation par N-acétylation, hydroxylation, O-déméthylation et glucuronidation Rapidement métabolisé Pas de potentiel d'accumulation Rapidement éliminé par les urines et fecès après conjugaison	pas de données	pas de donnée	Chez l'animal par voie orale, dégénérescence et nécrose des cellules épithéliales tubulaires proximales, dégénérescence et nécrose des hépatocytes	génétoxique in vitro/ in vivo; en cancérogénèse : augmentation des incidences des tumeurs de la glande mammaire, intestins, peau, glande thyroïdienne, glandes préputiales et clitorales, cavité orale, cerveau, foie, mesothélium, utérus/cervix suite à exposition du dihydrochlorure de diméthoxybenzidine dans l'eau de boisson chez le rat. Pas de données sur la reproduction.	effets endocriniens en chronique, voie orale, rat	EPA (2000) MAK (1986) TOXNET

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Benzidine (92-87-5)	Intermédiaire dans la synthèse de colorants	Carc 1A Restriction 0,1%w	184.26	401,7 / 116 à 129, selon la forme cristalline (5 formes allotropes) et selon la vitesse de chauffage	1.250 / 6.36	1,34 / peu solubles dans l'eau froide (0,4 g par litre à 12 °C), solubles dans l'eau chaude (9,4 g par litre à 100 °C) et dans de nombreux solvants organiques : cétones, acétates, alcools, oxyde de diéthyle ...	Absorption cutanée Distribuée dans l'organisme Métabolisée au niveau du foie Excrétée de façon variable selon les espèces	Chez le volontaire, l'application sur l'avant-bras pendant 48 h d'une gaze imprégnée de benzidine a entraîné une sévère dermatose de contact avec brûlure au lieu d'application.	Dermatoses chez des travailleurs par contacts cutanés répétés Irritation ou allergie favorisés par une photosensibilisation, la présence simultanée d'autres produits chimiques (hypochlorite de sodium en particulier) ou l'imprégnation alcoolique. Ces dermatoses constituent un signe d'alarme de l'exposition à la benzidine dont le véritable danger résulte des effets à long terme	Hyperémie, inflammation et papillomes de la vessie chez l'Homme	Génotoxique in vitro/ in vivo, effets cancérigènes sur foie et glandes mammaires après exposition orale, cutanée chez rat et souris, cancer vessie chez le chien. Pas de données sur la reproduction	non suspecté PE	fiche INRS (2007) TOXNET

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4-Amino-azobenzène (60-09-3)	Aromatic amines (azo dyes)	Carc 1B SVHC	197.2	360 à 101.325 kPa / 127	1.16 g/cm ³ à 20 °C / 0 Pa à 25 °C	3.19 / 34.3 mg/L à 25 °C	Métabolites retrouvés dans les urines	Non irritant	Réactions positives (à 0,25-5% de la substance testée) au patch-test chez des patients avec dermatites	Dermatites cutanées après exposition prolongée Par voie sous-cutanée, lésions préneoplasiques au niveau hépatique et pulmonaire	Génotoxique in vitro/in vivo, cancérigène chez l'animal : tumeurs du foie par voie orale et tumeurs de la peau après exposition cutanée ; pas d'étude sur la reproduction	Non suspecté PE	https://echa.europa.eu/TOXNET

Substances prioritised in textile clothing (CAS No.)	Uses	Harmonised self-classification REACH restriction	Physico-chemical properties				Toxicological properties					Sources	
			Molar mass (g.mol ⁻¹)	Boiling point/Melting point (°C)	Density/Vapor pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
4-Nonylphénol (NP) (104-40-5)	Process de fabrication des fibres textiles	Skin Corr 1 Repr 2 Eye Dam 1	220.34	42 à 44 / 293 à 324	7,6 à 25°C / 0,11 Pa à 25°C	5,76 / 7,3.10 ⁻³ g/L à 25°C	Chez l'homme absorption orale rapide Biodisponibilité par voie orale <20% car effet de premier passage hépatique, faible absorption cutanée Largement distribué dans l'organisme et principalement dans le graisses Métabolisme par glucuronidation et par la chaîne alkyl Elimination par les fecès et par les urines	Nonylphénols liquides corrosifs pour la peau et irritants oculaire sévère chez l'animal	Tests de maximisation chez le cobaye suggèrent que les NP n'ont pas de potentiel sensibilisant cutané significatif	Aucune donnée	Non mutagène, possiblement cancérigène. Perturbation du système reproducteur male et femelle en lien avec activité oestrogénique, toxicité testiculaire, pas de preuve d'effet sur le développement	Suspecté PE, activité estrogénique 10 ³ à 10 ⁶ fois moins forte que l'oestradiol	rapport expertise collective Anses saisine n°2009-SA-331, Novembre 2015

Substances prioritised in textile clothing (CAS No.)	Uses	Harmonised self-classification REACH restriction	Physico-chemical properties				Toxicological properties					Sources	
			Molar mass (g.mol ⁻¹)	Boiling point/ Melting point (°C)	Density/Vapor pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
Nonylphénols ethoxylés (NPE) (9016-45-9 26027-38-3 37205-87-1 68412-54-4 127087-87-0)	Auxiliaires pour le nettoyage, le rinçage, la teinture, le blanchiment et agent émulsifiant des huiles dans les fibres textiles	<i>Acute Tox 4</i> <i>Skin Irrit 2</i> <i>Eye Irrit 2</i> <i>Eye Dam 1</i> <i>STOT SE 3</i> <i>STOT RE 2</i> <i>Repr 2</i> Restriction : 0,01%w											rapport expertise collective Anses saisine n°2009-SA-331, Novembre 2015
CI Disperse Orange 37/76 (13301-61-6)	Dyes	<i>Skin Sens 1</i>											Aucune donnée : en attente modélisation QSAR

Substances prioritised in textile clothing (CAS No.)	Uses	Harmonised self-classification REACH restriction	Physico-chemical properties				Toxicological properties					Sources	
			Molar mass (g.mol ⁻¹)	Boiling point/Melting point (°C)	Density/Vapor pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
CI Disperse Yellow 23 (6250-23-3)	Dyes	-	Aucune donnée	/ 2,41.10-9 mmHg		5,75 / 6,04.10-5 mg/L	Pas de données Compte tenu de la connaissance du métabolisme des colorants azoïques par les azoréductases, les métabolites potentiels du Disperse Yellow 23 sont le para-aminophénol (CAS : 123-30-8), la para-phénylène diamine (CAS : 106-50-3) et l'aniline (CAS : 62-53-3)	Aucune donnée	Modélisation QSAR (DEREK 5.0.2 et VEGA 2.1.6) : Alerte sur le potentiel sensibilisant Métabolites possibles : para-phénylène diamine (CAS : 106-50-3) et aniline (CAS : 62-53-3) classés tous deux pour leur potentiel sensibilisant cutané	Aucune donnée	Modélisation QSAR (DEREK 5.0.2 et VEGA 2.1.6) : Alerte sur le potentiel génotoxique et cancérigène Métabolite possible : para-aminophénol (CAS : 123-30-8) classé pour sa génotoxicité	Non suspecté PE	Chem ID Plus 2016 ECHA 2016 TOXNET

Substances prioritised in textile clothing (CAS No.)	Uses	Harmonised self-classification REACh restriction	Physico-chemical properties				Toxicological properties					Sources	
			Molar mass (g.mol ⁻¹)	Boiling point/ Melting point (°C)	Density/Vapor pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
Anthracène (120-12-7)	Emission de HAP (provenant de fibres textiles synthétiques)	<i>Eye Irrit 2</i> <i>Skin Irrit 2</i> <i>Skin Sens 1</i>	178	342 à 101.3 kPa / 213.9 à 100 kPa	1.126 g/cm ³ à 20 °C / 0.001 - 7 800 Pa à 20 - 220 °C	4.65 à 20 °C and pH 7 / 30 - 75 µg/L à 25 °C and pH 6 - 7.5	Caractère lipophile des HAPs qui franchissent facilement les membranes cellulaires et se stockent dans les différents tissus Métabolisés en composés plus hydrosolubles Elimination dans les fèces et les urines	Irritant de la peau, des yeux, des muqueuses et du tractus respiratoire	Effets photosensibilisants rapportés lors de son utilisation dans le traitement du psoriasis (en solution dans un mélange de N-méthyl-2-pyrrolidone, d'éthanol et de propylène glycol), toutefois n'est pas un agent sensibilisant	Aucune donnée par voie cutanée et respiratoire	Absence d'effet cancérigène ou d'effet d'initiation chez la souris suite application cutanée. Activité photo-cancérigène chez la souris (carcinome épidermoïde). Absence d'effets cancérigènes chez le rat. Cas d'épithéliomes de la main, de la joue et du poignet observés chez des salariés manipulant de l'anthracène non raffiné. Pas d'effet sur la reproduction chez l'Homme.	Non suspecté PE	fiche INERIS 2005 et site Echa TOXNET

Substances prioritised in textile clothing (CAS No.)	Uses	Harmonised self-classification REACH restriction	Physico-chemical properties				Toxicological properties					Sources	
			Molar mass (g.mol ⁻¹)	Boiling point/Melting point (°C)	Density/Vapor pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
Nickel (7440-02-0)	Revêtement métallique Colorants métallifères	Skin Sens 1 Carc 2 STOT RE 1 Sels solubles de nickel Repro 1B Restriction : 0,5 µg/cm ² /semaine	Dépendant des composés du nickel				Absorption négligeable par voie cutanée mais dépend de la solubilité du composé Biodisponibilité variable selon la solubilité du composé	Irritation cutanée par les sels de nickel	Sensibilisation cutanée démontrée chez l'Homme Peu de données sur la sensibilisation par voie respiratoire	Irritation cutanée par exposition répétée à des solutions de sulfate et dichlorure de nickel > 20%	Clastogénicité et formation d'adduits ADN-protéines <i>in vitro</i> et <i>in vivo</i> par un mécanisme de stress oxydant Pas d'effet mutagène Effets cancérigènes peu possibles par voie respiratoire (résultats chez l'Homme et l'animal discutables) Sels solubles de nickel embryotoxiques, foetotoxiques et tératogènes chez l'animal	Non suspecté PE	ECHA proposal Oct. 2017

Substances prioritised in textile clothing (CAS No.)	Uses	Harmonised self-classification REACh restriction	Physico-chemical properties				Toxicological properties					Sources	
			Molar mass (g.mol ⁻¹)	Boiling point/ Melting point (°C)	Density/Vapor pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
Chrome VI (7440-47-3)	Formation non intentionnelle par oxydation des sels de chrome III utilisés comme agent de tannage du cuir	Selon les composés Carc 1A Carc 1B Muta 1B Repr 1B Repr 2 Skin Sens 1 Skin Irrit 2 Acute Tox 3 Restriction dans le cuir à 3 mg/kg	Dépendant des composés du chrome				Absorption cutanée limitée Réduction en Cr ³⁺ par glutathion Accumulation	Corrosif cutané après exposition répétée à fortes concentrations Irritant cutané modéré à faibles concentrations	Sensibilisant cutané : 20 000 - 50 000 nouveaux cas d'allergies en Europe par an (45% provenant d'une exposition par le cuir)	Irritant et corrosif cutané et respiratoire chez des professionnels exposés de façon répétée Toxicité rénale observée aux mêmes niveaux de concentrations en milieu professionnel	Mutagène <i>in vitro</i> et <i>in vivo</i> Effets cancérigènes pulmonaires chez l'animal, suspecté chez l'Homme Par voie orale, effets foetotoxiques observés chez le rongeur en l'absence de toxicité maternelle	Non suspecté PE	Restriction ECHA 2012
Cadmium (7440-43-9)	Colorants métallifères Revêtements métalliques Polymères	Acute tox 2 Muta 2 Carc 1B STOT RE 1 Repr 2 SVHC - Restriction 0,01%w	Dépendant des composés du cadmium				Faible absorption cutanée (augmentée avec le temps de contact)	Pas de données	Pas de données	Néphrotoxicité chez l'animal et l'Homme : dysfonctionnements et nécroses tubulaires rénales, protéinurie Troubles respiratoires et osseux	Effets génotoxiques sur cellules eucaryotes Effets cancérigènes pulmonaires chez le rongeur et chez l'Homme Chez l'animal, hyperactivité chez le rat exposé pendant la gestation, dommages testiculaires	Effets oestrogéniques <i>in vitro</i> et <i>in vivo</i> (activation récepteurs Erα) Effets métalloanrogènes <i>in vivo</i> et <i>in vitro</i>	IRIS US EPA TOXNET ATSDR INRS

Substances prioritised in textile clothing (CAS No.)	Uses	Harmonised self-classification REACH restriction	Physico-chemical properties				Toxicological properties					Sources	
			Molar mass (g.mol ⁻¹)	Boiling point/Melting point (°C)	Density/Vapor pressure	Log Kow / Solubility (water)	Toxicokinetics	Skin irritation	Skin sensitisation	Chronic toxicity	CMR		ED
Dibutylétain (DBT) (818-08-6)	Présence dans les enductions en polyuréthane, les mousses et les fibres élasthanes	<i>Eye Dam 1</i> <i>Muta 2</i> <i>STOT RE 1</i> <i>Repr 1B</i> <i>Skin Irrit 2</i> <i>STOT SE 1</i> <i>Skin Sens 1</i>	596,105	161.9 / 105	Pas de données	Pas de données pour Log Kow / 2,55 mg/L à 20 °C	Chez l'Homme, absorption cutanée lente et faible	Chez le lapin NZW, irritation cutanée et œdèmes modérés, desquamation. Persistance de l'érythème uniquement 14 jours après l'arrêt de l'exposition Non corrosif	Test de maximisation chez le cobaye albinos : 55% des animaux sensibilisés (grade modéré de sensibilisation allergique)	Aucune donnée par voie cutanée et respiratoire	Pas d'effet cancéro-gène observé chez le rongeur Clastogène <i>in vivo</i> Pas de potentiel mutagène <i>in vitro</i> sur bactéries (avec et sans activation métabolique) Chez le rat, déplétions lymphoïdes sévères au niveau du thymus chez les femelles et augmentation du nombre de résorptions	Aucune donnée disponible	ECHA

Annex 9: Biomedical study protocol

Objectives

The prevalence of contact allergies in the general population induced by the wearing of textile clothing and footwear in France is currently unknown. In addition, the literature data on the sensitising effects of chemical substances only give a partial picture of the extent of the number of allergenic substances (and their concentrations). The occurrence of contact dermatitis that may be related to the chemicals contained in textile clothing or footwear should therefore be prevented.

Les objectifs de ce protocole sont donc les suivants :

- ✓ To test the feasibility of a methodology for investigating cases of skin allergy or intolerance. Cette méthodologie vise à caractériser l'existence d'une relation d'association entre une dermatite allergique et la présence de substances chimiques dans un textile d'habillement ou un article chaussant.
- ✓ To identify chemicals potentially responsible for contact dermatitis relating to an article of textile clothing or footwear whose sensitising nature has not been documented.

The causality of one or more substances responsible for the occurrence of dermatitis from exposure was based on:

- ✓ les résultats du diagnostic médical comportant les explorations allergologiques habituelles,
- ✓ the results of the analyses of the chemical substances by the laboratories,
- ✓ le cas échéant, sur les résultats de test « papiers buvards », et
- ✓ the comparison of earlier data with the data from the literature analysis.

Le présent projet n'a pas pour but de réaliser une étude représentative de l'ensemble des cas de dermatites de contact liés aux articles chaussants ou aux textiles d'habillement, au cours d'une période donnée. Il s'agit d'une étude exploratoire permettant d'identifier des substances allergisantes. L'étude de faisabilité en 2016 portera sur :

- 25 cas de dermatite de contact liée aux textiles d'habillements,
- 20 cas de dermatite de contact liée aux articles chaussants.

Depending on the results of the study, this protocol could help establish and possibly disseminate a methodology for investigating cases of skin allergy or intolerance reported by physicians, in order to gain further knowledge about the substances in question. C'est pourquoi l'assurance contractée par l'Anses pour la recherche biomédicale sera valable aussi bien pour la durée de l'étude exploratoire que pour la méthodologie d'investigation.

La faisabilité du dispositif susmentionné sera testée auprès d'un échantillon de médecins volontaires compétents en dermato-allergologie. La présente recherche permettra de documenter des cas d'étude qui seront répertoriés dans un rapport. Une analyse statistique descriptive des données colligées sera réalisée.

Study partners

ANSES's partners were:

- The Revidal-GERDA dermato-allergology vigilance network, which brings together allergists from France, Belgium and Switzerland.

Ce réseau est une association à but non lucratif de loi 1924 regroupant environ 160 médecins, exerçant en cabinet privé et/ou dans des centres hospitaliers et recevant en consultation toute personne amenée à consulter pour une question dermatologique. L'association a pour objet, notamment, l'organisation de toutes études, recherches, travaux, expertises et expériences d'ordre scientifique et technique, concernant les problèmes relatifs aux phénomènes d'intolérance cutanée (allergie, irritation) et ce, quelle qu'en soit l'origine (professionnelle, médicamenteuse, cosmétologique, environnementale ou autre), l'amélioration des moyens de dépistage (étude des allergènes, sélection et contrôle de ceux-ci, fiabilité et standardisation des méthodes de tests), le regroupement des informations cliniques, chimiques, allergologiques et "épidémiologiques", concernant les allergies et les irritations.

Dix-huit médecins dermato-allergologues du réseau Revidal Gerda participeront à l'étude. These physicians practise in hospitals.

- Huit centres antipoison et de toxicovigilance (CAP) parmi les 9 existants.

These centres are attached to university hospital centres authorised to operate a poison control centre. They provide remote consultations and consultations relating to toxic exposure. They assess the risks of acute or chronic human exposure and give advice and guidance in diagnosis, prognosis and treatment to health professionals and the public. Les CAP participent activement à la toxicovigilance et sont répartis sur l'ensemble du territoire français (les centres participants sont situés à : Angers, Bordeaux, Lille, Lyon, Nancy, Paris, Strasbourg, Toulouse)..

- Four occupational disease clinics (CCPPs), out of a total of 32. Il s'agit des CCPP suivants : Créteil, Bordeaux, Fernand Widal (Paris), Cochin (Paris).

Ces CCPP sont intégrés dans les centres hospitaliers universitaires participant au Réseau national de vigilance et de prévention des pathologies professionnelles (RNV3P), dont l'ANSES est l'opérateur. Les consultations en CCPP sont principalement consacrées au diagnostic de pathologies professionnelles, aux conseils sur l'aptitude professionnelle, au suivi post-exposition ou post-professionnel ainsi qu'à l'aide et à l'orientation professionnelle des jeunes. Elles incluent également de plus en plus de consultations de diagnostic des pathologies environnementales.

- Two textile and footwear testing laboratories.
- ✓ Le Centre Technique du Cuir (CTC), comité professionnel de développement économique des industries de la peau brute, de la tannerie-mégisserie, de la chaussure, de la ganterie et de la maroquinerie. Le CTC a d'une part une mission de prestataire qualité et développement durable pour les industries du cuir, de la chaussure, maroquinerie, et, d'autre part, une mission de CPDE.
- ✓ L'Institut Français du Textile et de l'Habillement (IFTH), centre technique industriel. L'IFTH a pour mission d'apporter des réponses aux besoins d'acquisition de savoir-faire innovants, de développement et de pré-industrialisation de produits textiles, de transfert technologique vers des applications industrielles ainsi que de conseils stratégiques. Laboratoire de référence français accrédité pour la qualité et la sécurité des produits textile-habillement, l'IFTH maîtrise le processus global de qualification des produits, depuis la définition de la normalisation, la mise au point de nouveaux tests, la réalisation de tests et essais, l'accompagnement à la certification et jusqu'à la promotion de l'Assurance Qualité Client.

- A principal investigator.

Population concerned by the study/criteria for inclusion in/exclusion from the study

La population cible de l'étude est constituée de l'ensemble des personnes, sans distinction d'âge ou de sexe, résidant en France métropolitaine présentant une dermatite de contact, ayant comme cause probable un textile d'habillement ou un article chaussant, et consultant ou ayant consulté soit un médecin dermato-allergologue du réseau Revidal Gerda soit un médecin d'un CCPP participant à l'étude ou ayant contacté la RTU CAPTV.

Exclusion criteria:

- Any person presenting with a dermatitis with a non-allergic origin consulting either a dermatologist-allergist from the Revidal-GERDA network or a physician from a CCPP participating in the study.
- Toute personne présentant une dermatite dont l'origine ayant comme cause possible un textile d'habillement ou un article chaussant ayant contacté la TRU d'un CAPTV et dont le diagnostic n'est pas confirmé par un médecin du réseau Revidal Gerda ou par un médecin d'un CCPP.
- For this study, minors, adults protected by the law, pregnant and breastfeeding women, and individuals receiving immunosuppressive therapy were excluded.

Chosen observation or investigation method

Sampling plan

All the cases of contact dermatitis whose suspected origin was a chemical substance in an article of textile clothing or footwear were collected during the study. Les patients seront recrutés parmi la population concernée par l'étude (cf. chapitre 6).

Procedure followed for the study

Recruitment of cases

Les cas pouvant être inclus dans le protocole seront recrutés selon les deux voies suivantes :

- Par les consultations d'un médecin volontaire du Réseau Revidal Gerda ou d'un CCPP participant.
- Par un appel téléphonique d'un patient (ou d'un professionnel de santé) à la RTU d'un CAPTV participant.

Consultation d'un médecin du réseau Revidal Gerda ou d'un CCPP

Tout patient consultant un médecin participant à l'étude (issu du réseau Revidal Gerda ou d'un CCPP) et présentant une dermatite de contact suspectée d'être en lien avec un textile d'habillement ou un article chaussant se verra proposer par le médecin durant la consultation de participer à l'étude (figure 1). Le médecin devra alors :

- informer le patient des objectifs, des tenants et des aboutissants de cette étude, et lui remettre une lettre d'information (cf. annexe 2),
- lui faire signer un document certifiant son consentement éclairé pour participer à l'étude (cf. annexe : accord du patient),
- procéder aux explorations habituelles (patch-tests) afin de tenter d'identifier la substance à l'origine de la dermatite de contact. The patch tests, which are standard tools used by dermatologist-allergists in consultations, were systematically performed by the physician.

Le patch-test est un test diagnostique permettant l'identification de la ou des substances responsables de l'eczéma allergique de contact. Il consiste en l'application sur la peau des molécules / produits suspectés pendant 48 heures, temps nécessaire pour l'apparition de la lésion d'eczéma uniquement avec la substance responsable connue.

- remplir une fiche d'information anonymisée avec les résultats des patch-tests (ces résultats seront lus 48 heures et 96 heures après la réalisation du test par le médecin lors d'une deuxième et troisième consultation), la photo/schéma de la dermatite de contact et le questionnaire inclus dans cette fiche d'information permettant aux laboratoires d'analyses de sérier leur recherche de substances (cf. annexes 1 et 4).

L'anonymisation sera effectuée par le médecin. Celui-ci anonymisera la fiche de renseignements qu'il aura complétée lors de la 2^{ème} ou 3^{ème} consultation afin que le laboratoire ne dispose que des seules informations en lien avec les résultats des patch-tests et les photos/schémas de la dermatite. Seul le médecin aura la possibilité de faire le lien entre l'identité du patient et la fiche de renseignements qui aura été complétée.

Le codage s'effectuera comme suit pour les cas issus du réseau Revidal Gerda ou des CCPP : Ville - R ou C (Revidal ou CCPP) – Initiales du Médecin (Nom Prénom) – n° du cas (1,2,3... par médecin).

Lors de ces consultations, les textiles ou articles chaussants suspectés d'être la cause probable de dermatites allergiques, seront recueillis par les médecins et seront ensuite envoyés aux laboratoires d'analyse sus mentionnés avec la fiche d'information anonymisée, afin de déterminer et quantifier les substances présentes dans ces articles potentiellement à l'origine des dermatites de contact.

Le médecin enverra par ailleurs la fiche d'informations anonymisée à l'ANSES afin d'assurer la traçabilité des différentes analyses et permettre à l'ANSES de compiler par la suite les résultats des analyses de chaque cas.

Les résultats de l'analyse de chaque textile/article chaussant par les laboratoires seront transmis à l'Anses (UESC) à l'intention du COPIL.

Une expertise des résultats de chaque cas sera faite par le COPIL afin de juger de l'imputabilité des substances identifiées dans les articles vis-à-vis des effets rapportés par le médecin prenant en compte les données médicales et les données des laboratoires. Un rapport sur chaque cas sera établi par le COPIL.

Les résultats des analyses effectuées par les laboratoires et les conclusions du COPIL seront adressées au médecin à l'origine de la déclaration du cas de dermatite.

Ce dernier communiquera à son patient le résultat des analyses de laboratoire ainsi que les conclusions de l'expertise d'imputabilité réalisée par le COPIL.

Figure 1 : Protocole d'étude clinique : conduite à tenir par le médecin en présence d'un patient présentant une suspicion d'allergie cutanée pouvant être en lien avec article chaussant ou / et un textile d'habillement

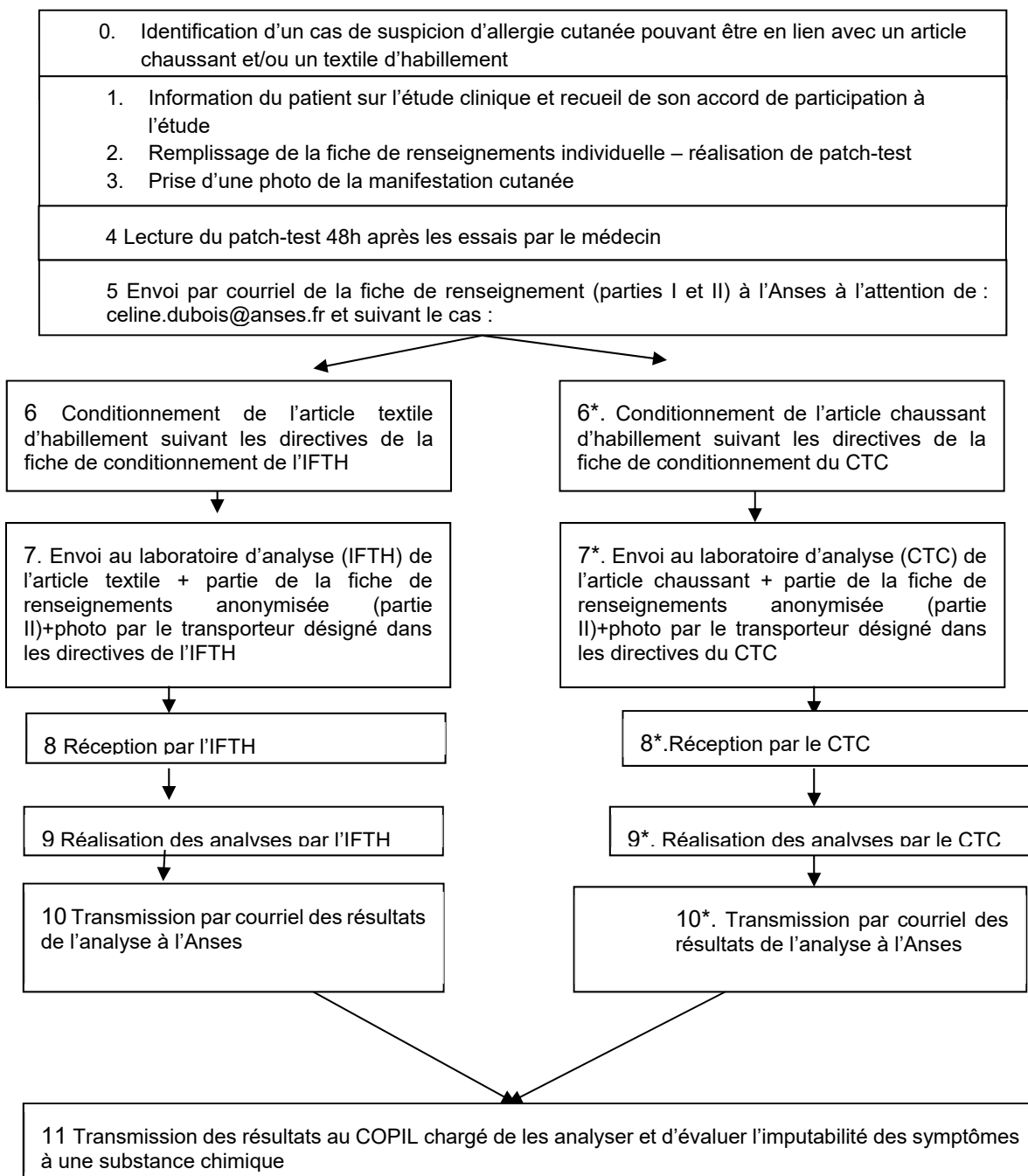
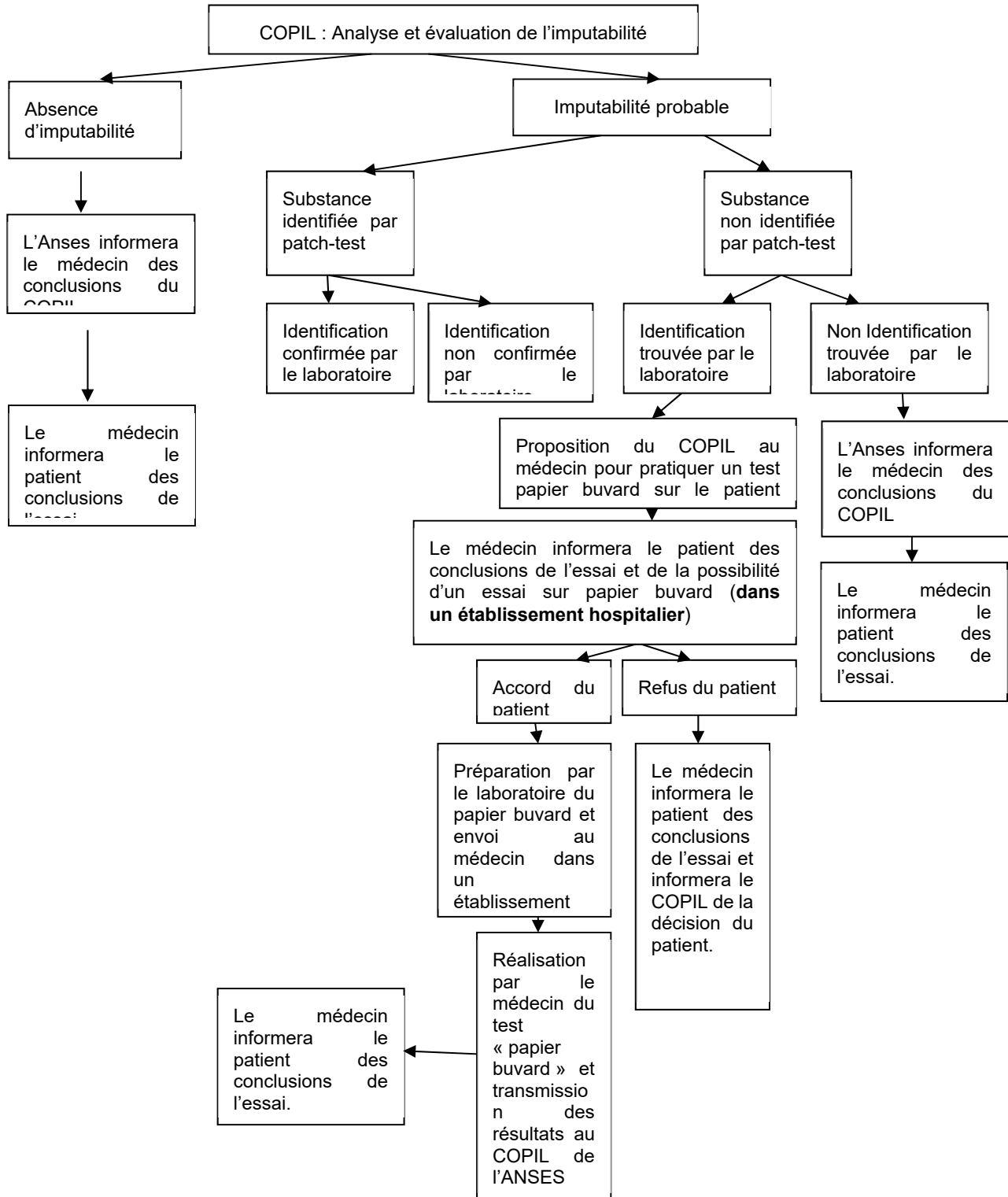


Figure 2 : Analyse et évaluation de l'imputabilité



Réponse téléphonique à l'urgence toxicologique auprès d'un médecin d'un CAPTV

Tout patient appelant un CAPTV en raison d'une suspicion de dermatite de contact susceptible d'être liée à un textile d'habillement ou un article chaussant, se verra proposer par le médecin répondant (figure 3) :

- de consulter son médecin traitant pour une prise en charge médicale immédiate et communiquer les coordonnées du médecin traitant au médecin du CAPTV. Le médecin du CAPTV informera aussitôt le médecin traitant pour lui faire part des objectifs et des modalités de l'étude ;
- le médecin traitant communiquera au patient les informations sur les objectifs de l'étude et la liste des médecins partenaires du projet afin qu'il puisse entrer, le cas échéant, dans le protocole de l'étude.

Si la pathologie est potentiellement en lien avec un article chaussant ou un textile d'habillement, le médecin du réseau Revidal Gerda ou d'un CCPP proposera au patient de participer à l'étude et devra alors :

- informer le patient des objectifs, des tenants et des aboutissants de cette étude, et lui remettre une lettre d'information (cf. annexe 2),
- lui faire signer un document certifiant son consentement éclairé pour participer à l'étude (cf. annexe : accord du patient),
- procéder à des patch-tests afin de tenter d'identifier la substance susceptible d'être à l'origine de la dermatite de contact. Les patch-tests seront systématiquement réalisés par le médecin.

Le patch-test est un test diagnostique permettant l'identification de la ou des substances responsables de l'eczéma allergique de contact. Il consiste en l'application sur la peau des molécules / produits suspectés pendant 48 heures, temps nécessaire pour l'apparition de la lésion d'eczéma uniquement avec la substance responsable connue.

- remplir une fiche d'information anonymisée avec les résultats des patch-tests (ces résultats seront lus 48 heures et 96 heures après la réalisation du test par le médecin lors d'une deuxième et troisième consultation), la photo de la dermatite de contact et le questionnaire inclus dans cette fiche d'information permettant aux laboratoires d'analyses de sérier leur recherche de substances (cf. annexes 1 et 4).

Si un professionnel de santé contacte un CAP pour un patient pouvant être inclus dans l'étude, le CAP pourra proposer au professionnel de santé, avec l'accord de son patient, de faire objectiver sa dermatite de contact par un médecin du réseau Revidal Gerda ou d'un CCPP.

Dans le cas où un patient pouvant être inclus dans l'étude et ayant déjà consulté un professionnel de santé, appelle un CAP, celui-ci pourra orienter le patient directement vers un médecin du réseau Revidal Gerda ou d'un CCPP (se référer au protocole au paragraphe 7.2.1.1).

L'anonymisation sera effectuée par le médecin du Revidal Gerda ou du CCPP. Celui-ci codera la fiche de renseignements qu'il aura complétée lors de sa consultation afin que le laboratoire ne dispose que des seules informations en lien avec les résultats des patch-tests et les photos de la dermatite. Seul le médecin aura la possibilité de faire le lien entre l'identité du patient et la fiche de renseignements qui aura été complétée.

Le codage s'effectuera comme suit pour les cas issus des CAP : Ville - R ou C (Revidal ou CCPP) - CAP – Initiales du Médecin (Nom Prénom) – n° du cas (1,2,3...par médecin)

Lors de ces consultations, les textiles ou articles chaussants suspectés d'être la cause probable de dermatites allergiques, seront recueillis par les médecins et seront ensuite envoyés aux laboratoires d'analyses sus mentionnés avec la fiche d'information anonymisée, afin de déterminer et quantifier les substances présentes dans ces articles potentiellement à l'origine des dermatites de contact.

Le médecin enverra par ailleurs la fiche d'informations anonymisée à l'ANSES afin d'assurer la traçabilité des différentes analyses et permettra à l'ANSES de compiler par la suite les résultats des analyses de chaque cas.

Les résultats de l'analyse de chaque textile/article chaussant par les laboratoires seront transmis à l'Anses (UESC) à l'intention du COPIL.

Une expertise des résultats de chaque cas sera faite par le COPIL afin de juger de l'imputabilité des substances identifiées dans les articles vis-à-vis des effets rapportés par le médecin prenant en compte les données médicales et les données des laboratoires. Un rapport sur chaque cas sera établi par le COPIL.

Les résultats des analyses faites par les laboratoires et les conclusions du COPIL seront adressées au médecin à l'origine de la déclaration du cas de dermatite.

Ce dernier communiquera à son patient le résultat des analyses de laboratoire ainsi que les conclusions de l'expertise d'imputabilité réalisée par le COPIL.

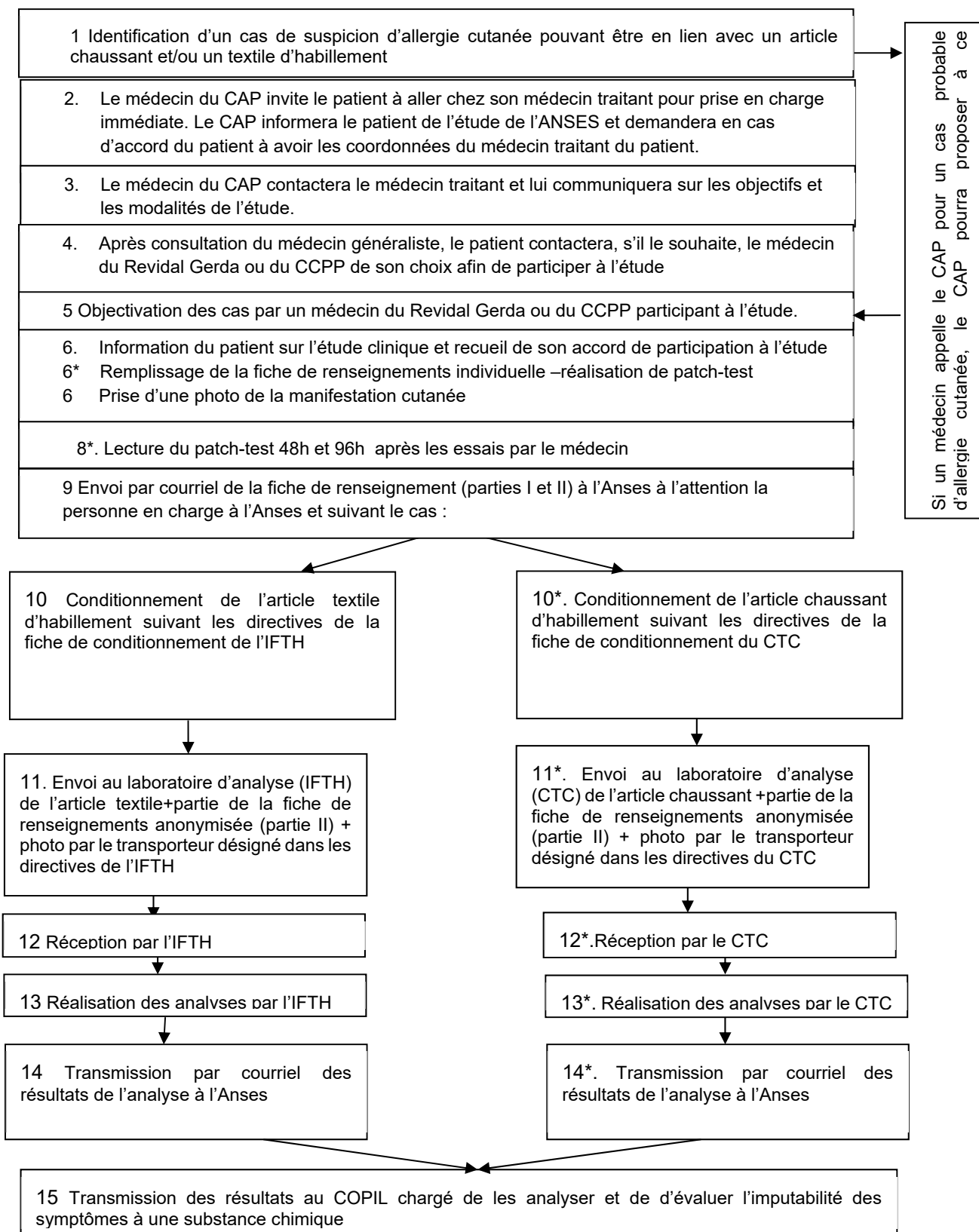


Figure 3 : Protocole de recherche pour un cas issu téléconsultation d'urgence d'un CAPTV

La suite du protocole est la même que pour la figure n°2 « analyse de l'imputabilité ».

Essais par les laboratoires d'analyses (CTC et IFTH)

Les laboratoires recevront le textile ou l'article chaussant ainsi que la fiche de renseignements anonymisée et procéderont aux analyses afin d'identifier ou de quantifier, dans la mesure du possible, la (es) substance(s) à l'origine de la dermatite de contact.

Lorsque les essais effectués utilisant l'ensemble des méthodes disponibles au laboratoire (*screening*), n'auront pas permis d'identifier une substance ou famille de substances, la recherche du laboratoire s'arrêtera et un rapport sera transmis à l'Anses L'Anses transmettra au COPIL les résultats du laboratoire listant :

- all the methods used,
- Les limites techniques n'ayant pas permis d'identifier une substance (signal trop faible ou absence d'étalon permettant l'identification car substance inconnue, produit de dégradation, métabolite.. .etc.).

Si une nouvelle substance (ou famille de substances) est identifiée par le laboratoire lors du screening (une « nouvelle substance » correspond à une substance autre que les substances définies par l'ANSES et les laboratoires⁴²), une recherche bibliographique concernant l'évaluation de la toxicité de la substance sera réalisée par l'ANSES qui indiquera au laboratoire s'il convient ou non d'ajouter cette substance à la liste des substances à rechercher/ quantifier dans les échantillons suivants (après avis du COPIL).

Test dit du 'papier buvard'

Si cette nouvelle substance probablement à l'origine du cas⁴³ est quantifiée sur l'article chaussant ou textile, le laboratoire enverra au dermato-allergologue en charge du cas, après accord du patient par son médecin et dans la mesure de la faisabilité technique, un test « papier buvard ».

Ce « papier buvard » contiendra ladite substance afin que le médecin puisse tester l'effet sur le patient et tenter de corrélérer l'effet clinique observé avec celui constaté précédemment.

La quantité de nouvelle substance qu'il faudra déposer sur le papier buvard sera définie entre le COPIL, le laboratoire et le médecin. Le médecin qui procédera au test du papier buvard sera en charge de définir si ce test est positif sur le patient.

Le protocole et les moyens permettant de mettre en œuvre ce test de « papier buvard » devront être transmis au laboratoire.

This "supplementary patch test" had to be performed in a hospital under the responsibility of a volunteer doctor from the Revidal-GERDA network or the CCPP, consulting in the hospital environment.

Lorsque le laboratoire d'essais recevra un article à tester, celui-ci devra adresser son rapport sur les résultats d'essais dans les 4 à 5 semaines suivant la réception à l'Anses à l'intention du COPIL

Interpretation of the results of the analyses performed by the laboratories

The reports and results of the tests carried out by the laboratories were presented to the COPIL.

Le COPIL aura pour missions de :

- 1/ Elaborer une grille d'évaluation de l'imputabilité,
- 2/ Evaluer l'imputabilité de la dermatite de contact du patient avec la ou les substances identifiées.

⁴² Identification of substances between the laboratories and ANSES was carried out by comparing data from:
- the literature, mainly via the reports by the European agencies that worked on the topic,
- the databases of the analysis laboratories.

⁴³ New substances were quantified using a set of analytical methods available in the analysis laboratories along with all the appropriate analytical techniques.

L'imputabilité de la dermatite à l'exposition à une ou plusieurs substances reposera sur :

- the conclusions of the medical diagnosis,
- the results of the analyses of the chemical substances by the laboratories,
- where applicable, the results of the "supplementary patch tests",
- the comparison of earlier data with the data from the literature analysis,
- the contribution of one or more substances found in the textile clothing/footwear that could result from the conditions of use. This enabled the COPIL to assess whether the origin of the substance identified in the analysis was related to the textile/footwear itself or to the article's conditions of use by the patient, such as washing, surface treatments or fragrances. Le COPIL pourra se fonder sur les données bibliographiques et l'expertise des laboratoires d'analyse.

Le COPIL pourra également évaluer la faisabilité du protocole notamment la capacité à relier les résultats d'un patch-test à une substance identifiée dans un article textile/chaussant et la capacité à identifier une nouvelle substance aux tests par papier buvard.

Communication des résultats des analyses au patient

The Steering Committee conducted an expert appraisal of the results of each case to determine the accountability of the substances identified in the articles with regard to the effects reported by the physician, taking into account the medical data and the data from the laboratories. L'étude de l'imputabilité est réalisée à partir :

- De la fiche de renseignements de chaque cas,
- Du rapport d'analyses reçu du laboratoire d'essais.

A report on each case was produced by the COPIL.

The results of the analyses carried out by the laboratories and the COPIL's conclusions were then sent to the physician initially reporting the case of dermatitis.

Ce dernier communiquera à son patient le résultat des analyses de laboratoire ainsi que les conclusions de l'expertise d'imputabilité réalisée par le COPIL.

Si une substance est identifiée dans l'article comme étant en cause dans le cas de la dermatite de contact, le médecin pourra procéder après accord du patient, à des tests « papier buvard » avec cette substance afin de confirmer les conclusions du COPIL.

Critères de faisabilité

Les critères de faisabilité doivent viser à répondre aux questions suivantes :

- Chaque partenaire (médecin, COPIL, Anses, laboratoire...) etc. a-t-il réalisé ce qui était attendu de lui au regard des rôles attribués dans le protocole ?
- Quel est le ratio du nombre de médecins ayant accepté de participer au protocole et qui appliquent le protocole tel que prévu sur l'ensemble des praticiens qui ont accepté de participer à l'étude ?
- Les circuits proposés depuis le signalement du cas jusqu'à la communication des résultats des tests après examen par le COPIL présentent-ils des difficultés pour les patients ? Le cas des patients repérés par les CAPTV sera particulièrement étudié, notamment le nombre de patients ayant donné le nom d'un médecin traitant, et celui de ceux qui sont allés consulter par la suite un médecin de CCPP ou Revidal Gerda

- Combien de patients dont le diagnostic d'allergie cutanée était confirmé ont suivi l'ensemble des étapes du parcours de soin prévu dans le protocole sur le total des patients dont le diagnostic d'allergie était confirmé et qui avaient donné leur accord pour participer à l'étude ?
- Combien de patients dont le diagnostic d'allergie était confirmé ont abandonné le parcours de soin proposé dans le protocole – le cas échéant préciser les motifs d'abandon pour chaque cas ?

Bénéfice au patient et suivi médical

Le bénéfice attendu pour le patient est l'identification formelle de la substance en cause dans sa dermatite de contact permettant ensuite son éviction.

Le patient sera suivi par le médecin afin que l'allergie de contact qu'il a déclaré puisse être traitée.

Ces informations pourront figurer dans son dossier médical.

Results

Les résultats de cette étude biomédicale sont attendus pour juin 2017.

En effet, avant de pouvoir commencer une telle étude, les accords d'un Comité de Protection des Personnes, de l'Autorité Compétente (ANSM) et une déclaration à la CNIL sont nécessaires.

L'Anses a obtenu l'avis favorable du Comité de Protection des Personnes fin septembre 2016.

Le dossier a également été soumis à l'ANSM. La recevabilité a été acceptée, et la réponse de l'ANSM doit être délivrée à l'ANSES avant fin décembre 2016.

Enfin la déclaration à la CNIL est en cours.



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