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Hazardous chemicals in textiles

– report of a government assignment

SWEDISH CHEMICALS AGENCY

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Foreword

On 20 December 2012 the Swedish Chemicals Agency was assigned by the Swedish government to develop proposals and principles for a coherent piece of EU legislation on hazardous substances in textiles. The objective of the assignment was to develop the proposals presented in KemI report 1/12 “Improved EU rules for A Non-Toxic Environment”, where textiles were identified to be a group of products where specific rules on chemicals are required at EU level.

The assignment states that the report to the government shall include a review of the hazardous chemicals that may be present in textiles, an evaluation of the risks that hazardous chemicals in various textiles may entail a negative list of chemicals that should be restricted in textiles and a legislative proposal for a regulation at EU level. The assignment should be made in dialogue with the textile industry and after consultation with the Swedish Environmental Protection Agency and the Swedish Consumer Agency.

The assignment was presented and discussed at a meeting with the Swedish textile industry .A questionnaire concerning different legislation options was sent to 80 experts, organisations and authorities in Sweden and in the EU. The impact assessment of the proposed policy option has been made in a simplified and qualitative manner, primarily based on the input received by the Swedish Chemicals Agency during the stakeholder consultation.

A reference group with representatives from relevant authorities, industry associations, the textile industry, NGOs and laboratories was formed and has been of invaluable assistance with knowledge and enthusiasm in this report.

Members of the project group at the Swedish Chemicals Agency, were Anna Nylander (project leader), Dag Lestander, Johan Forsberg, Jörgen Henriksson, Margareta Warholm, Patrik Ernby, Stellan Fischer and Susan Strömbom. Kristin Häglund, graduate student from Karolinska Institutet and Maria Wallin at the Swedish Chemicals Agency also contributed to the work. In addition, Elisabeth Österwall and Sanna Due, the Swedish Environmental Protection Agency and Joséphine Slotte, the Swedish Consumer Agency were consultation partners during this assignment. Agneta Falk-Filipsson, Head of Unit at the Swedish Chemicals Agency, was responsible for the assignment.

Sundbyberg, April 2013

Swedish Chemicals Agency

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Background

The Swedish Chemicals Agency (Kemikalieinspektionen) has been assigned by the Swedish government to further develop the idea of a coherent piece of EU legislation on hazardous chemicals in textiles. The assignment should be made in dialogue with the textile industry and in consultation with the Swedish Environmental Protection Agency and the Swedish Consumer Agency.

Large quantities of chemicals are used in the manufacture of textiles. Some of these chemicals are harmful to human health and the environment and, for example, cause allergic reactions or are persistent or bioaccumulating. Textiles make up a very broad category of products and are used in a way by which consumers, including children, are directly or indirectly exposed to the products' chemical content. It is difficult to know exactly which hazardous chemicals are present in textile products since the supply chains are long, complex and global. Today there is no unified legislation at the EU level covering the wide range of hazardous chemicals that may be present in textile products. There are, however, a number of voluntary labels and restrictions lists used by the industry to limit chemical content in textiles. These voluntary efforts are not harmonised. In order to obtain a more cohesive handling of chemicals in textiles, there is a need for regulation at the EU level.

The investigation

The Swedish Chemicals Agency has investigated which chemicals with hazardous properties that are used in the textile production. Furthermore, the hazardous chemicals that may be found in the final textile product have been listed. A non-exhaustive list of substances falling within the chosen definition of hazardous chemicals is finally presented as an indicator of which chemicals that may need to be restricted.

In this report the Textile Fibre Regulation (EC) No 1007/2011 is presented as the main regulatory option to be considered, but other alternative ways to regulate chemicals in textiles are also discussed. The assessment of the different regulatory options is to a large extent based on consultation with a selected number of Swedish and European stakeholders. The potential human health and environmental impacts, as well as possible economic impacts, are described in a simplified impact assessment.

Conclusions

The Swedish Chemical Agency´s overall recommendation is to regulate hazardous chemicals in textiles in the 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. In practice the proposal implies that new articles are to be added to the Regulation, and this would be a further harmonisation within the already existing regulation on textile products.

The Swedish Chemical Agency is of the opinion that a regulation of hazardous chemicals in textiles should be based on intrinsic properties of the substances. In the report, a number of criteria for properties concerned have been set up. The regulation should primarily be based on harmonised classification of substances. Maximum allowed concentration levels in the

final product should be set to the classification limit for each substance (according to the CLP Regulation (EG) No 1272/2008). In addition, the regulation should provide a procedure by which concentration limits can be made more strict (relative to concentration limits in CLP), based on a case-by-case evaluation of chemicals contained in textile products. Similarly, for some substances which do not have a harmonised classification according to CLP, the maximum allowed concentration limit will also have to be evaluated on a case-by-case basis. This is especially motivated with regard to endocrine disrupting chemicals (EDCs) and substances that are persistent, bioaccumulating and toxic (PBT) or are very persistent and very bioaccumulating (vPvB), which are found in textile products (and which are not covered by the basic scope of classified substances in the proposed regulation).

Furthermore, the Swedish Chemicals Agency concludes that the regulation should be constructed so that the potential negative economic impacts are minimised, for example by allowing derogations for continued use of some chemicals under certain circumstances (to be applied for by industry themselves), and that guidance should be provided (in addition to the legal obligations) on which substances (or groups of substances) that may be relevant to control/substitute in textile products and which testing methods that are advised for verification of compliance.

In the stakeholder consultation, there were indications that most textile companies consider a risk-based approach to be the best option for further regulation of chemicals in textile products. The Swedish Chemicals Agency, on the other hand, finds that there are major benefits (in terms of human health and environmental impacts) that favour a regulation based on intrinsic hazardous properties.

Proposal

The proposed regulation implies that hazardous chemicals with certain harmonised classification which can be found in finished textile products should be regulated at three different levels:

Level 1: Regulation without limited restrictions

- Substances contained in the final textile product with harmonised classification as Carcinogenic, Mutagenic and toxic to Reproduction (CMR), Category 1A/1B (Risk phrases H340, H350 and H360).
- Substances contained in the final textile product with harmonised classification as environmentally hazardous: Aquatic Chronic 1 (H410) , including the few substances of this kind on the present Candidate List in REACH that do not fall under the above mentioned classification criteria but which are currently known to be used in the production of textiles.

Level 2: Regulation with limited restrictions

- Substances contained in the final textile product with harmonised classification as respiratory and/or skin sensitising (H334 and H317). This restriction applies to textile clothing or products referred to in Article 2.2 (b) according to the Fibre Labelling Regulation.

There will be a possibility, under certain circumstances and on a case-by-case basis, to derogate substances regulated at level 1 and 2. Derogations are to be applied for by industry themselves.

Level 3: Procedure for including other substance or groups of substances and for lowering the maximum allowed concentration level

The Swedish Chemicals Agency also suggests including a procedure in the regulation to include other substances or groups of substances remaining in the final textile product on a case-by-case basis, in line with the procedure in the Toy Safety Directive (EG) No 2009/48 and its Annex C. Some examples of substances contained in the final textile product that should be considered for further restriction are:

- Substances which are defined as endocrine disrupting substances (EDC), when criteria for those substances have been set[1] .
- Substances of Very High Concern (SVHC) included in the REACH Candidate List according to article 57d (PBT), 57e (vPvB) and 57 f (substances of equivalent level of concern, eg. endocrine disruptors).
- Harmonised classified CMR Category 2 substances.
- Self-classified substances when necessary.

A similar procedure as above should also be applicable in case the maximum allowed concentration levels, according to the restriction of level 1 and 2 substances, need to be made stricter in order to protect human health and the environment from identified risks.

In line with the above proposal, a proposal for a regulatory text is presented in Annex 1to this report.

[1] The criteria do not refer to the classification criteria of CLP. They refer to the European Commission´s work with identifying criteria for EDCs, which can be found in the draft outline of the Commission.

Sammanfattning

Bakgrund

Kemikalieinspektionen (KemI) har fått i uppdrag av regeringen att utveckla förslag om mål och principer för en sammanhållen EU-lagstiftning för kemikalier i textilier. Uppdraget ska genomföras i dialog med textilindustrin och i samråd med Naturvårdsverket och Konsumentverket.

Stora mängder kemikalier används vid tillverkning av textilier. Vissa av dessa är skadliga för hälsan och miljön, de är till exempel allergiframkallande eller är svårnedbrytbara eller bioackumulerande. Textilier är en mycket bred kategori produkter och de används på sådant sätt att konsumenter, även barn, direkt eller indirekt exponeras för de kemikalier som ingår i dem. Det är svårt att veta exakt vilka kemikalier som finns i textilprodukter eftersom leverantörskedjan är lång, komplex och global.

Det finns idag ingen enhetlig EU-lagstiftning som täcker alla farliga kemikalier som kan finnas i textilier. Inom textilindustrin används dock ett antal frivilliga märkningar och restriktioner, avsedda att begränsa kemikalieinnehållet i textilier. Dessa åtgärder är inte harmoniserade. För att få en mer enhetlig hantering av kemikalier i textilier krävs en reglering på EU-nivå.

Utredningen

Kemikalieinspektionen har utrett vilka kemikalier med farliga egenskaper som används i textilindustrin. Dessutom har de kemikalier som kan finnas kvar i den färdiga textilprodukten listats. En icke uttömmande lista över ämnen som omfattas av den definition av ”farliga ämnen” som tagits fram inom ramen för detta uppdrag presenteras i rapporten. Listan kan ses som en fingervisning på vilka ämnen som kan behöva begränsas.

I denna rapport presenteras Europaparlamentets och Rådets Förordning (EG) nr 1007/2011 om benämningar på textilfibrer och därtill hörande etikettering och märkning av fibersammansättningen i textilprodukter (hädanefter Fibermärkningsförordningen) som det bästa alternativet för en reglering. Ett antal alternativa förslag till reglering diskuteras dock också. Bedömningen av de olika åtgärdsalternativen är i stor utsträckning baserad på samråd med svenska och europeiska intressenter. Möjliga konsekvenser på människors hälsa och miljön, samt ekonomiska konsekvenser, beskrivs i en förenklad konsekvensanalys.

Slutsatser

Kemikalieinspektionens rekommendation är att skadliga kemikalier i textilier ska regleras i Fibresmärkningsförordningen. I praktiken innebär detta att nya artiklar läggs till i direktivet. Detta skulle leda till ytterligare harmonisering inom en redan existerande reglering av textilprodukter.

Kemikalieinspektionen anser att en reglering av kemikalier i textilier bör bygga på inneboende egenskaper hos ämnena. I rapporten har ett antal kriterier för vilka egenskaper som ska omfattas satts upp. Regleringen bör baseras på harmoniserad klassificering av ämnen. De maximala haltgränserna i färdiga produkter bör sättas till klassificeringsgränsen för varje ämne som omfattas av regleringen (i enlighet med CLP förordningen (EG) nr 1272/2008). I regleringen bör det ges utrymme att sätta striktare haltgränser än de som finns i CLP genom

en procedur där ämnen bedöms från fall till fall. Även för kemikalier som inte har någon harmoniserad klassificering enligt CLP ska haltgränser kunna sättas från fall till fall. Detta gäller särskilt kemikalier som återfinns i textilier och som har hormonstörande egenskaper (EDC), är svårnedbrytbara, bioackumulerande och toxiska (s.k. PBT-ämnen) eller mycket svårnedbrytbara och mycket bioackumulerande (s.k. vPvB-ämnen) och vilka inte täcks av ovanstående kriterier.

Regleringen bör vidare vara konstruerad på så vis att potentiella ekonomiska effekter minimeras, till exempel genom att tillåta undantag för att använda vissa kemikalier under vissa förutsättningar. Vägledning bör erbjudas om vilka kemikalier som kan vara aktuella att kontrollera eller byt ut i textilprodukter, samt vilka testmetoder som bör användas för att säkerställa efterlevnad.

I samrådet framkom att flera företag anser att en reglering av kemikalier i textilier bör bygga på riskbedömning, men Kemikalieinspektionen anser att det finns stora fördelar att basera regleringen på inneboende egenskaper.

Förslag

Den föreslagna regleringen innebär att farliga kemikalier med särskilda harmoniserade klassificeringar som kan finnas i textilprodukter regleras på tre olika nivåer:

Nivå 1: Reglering utan begränsade restriktioner

- Ämnen i färdiga textilprodukter med harmoniserad klassificering CMR, kategori 1A och 1B (omfattar ämnen som är cancerframkallande, kan skada arvsmassan eller är skadliga för reproduktionen) (riskfraser H340, H350 och H360).
- Ämnen i färdiga textilprodukter med harmoniserad klassificering Aquatic Chronic 1.
- (ämnen som kan orsaka långsiktiga effekter i vattenmiljön) (H410), samt några ämnen uppsatta på kandidatlistan under Reach som inte ryms inom kriteriet ovan, men som man vet används i textilindustrin.

Nivå 2: Reglering med begränsade restriktioner

- Ämnen i färdiga textilprodukter som är harmoniserat klassificerade som allergiframkallande vid inandning/på hud (H334 och H317). Denna begränsning gäller endast för kläder av textil och produkter som omfattas av artikel 2.2 (b) i Fibresmärkningsförordningen.

Under vissa omständigheter ska ämnen kunna undantas från begränsning enligt nivå 1 och 2. Företagen ansöker själva om sådant undantag.

Nivå 3: Procedur för att inkludera andra ämnen eller grupper av ämnen, samt för att sänka haltgränser

Kemikalieinspektionen föreslår att en procedur inkluderas i regleringen för att från fall till fall lägga till ämnen eller grupper av ämnen som kan finnas i färdiga produkter. Samma förfarande finns idag i bilaga C i Leksaksdirektivet 2009/48/EG. Exempel på ämnen som skulle kunna omfattas av en reglering är:

- Ämnen i den färdiga produkten som är hormonstörande, så snart som kriterier för sådana ämnen har fastslagits.
- SVHC-ämnen (det vill säga ämnen som kan ha allvarliga effekter på människors hälsa eller för miljö) upptagna på Reach kandidatlista i enlighet med artikel 57d PBT), 57e (vPvB) och 57f (ämnen som inger motsvarande betänkligheter till exempel hormonstörande ämnen).
- Ämnen med en harmoniserad klassificering som CMR kategori 2.
- Självklassificerade ämnen, i den mån det anses nödvändigt.
- Möjlighet till undantag för vissa kemikalier under särskilda omständigheter. Industrin får själva ansöka om undantag.

En procedur som liknar den som beskrivs ovan bör även vara tillämplig i de fall som en maximal haltgräns för ämnen som omfattas av reglering i enlighet med nivå 1 och nivå 2, måste göras striktare för att skydda människors hälsa eller miljön från identifierade risker.

Ett förslag till lagtext presenteras i en bilaga till rapporten.

1. Introduction

Textiles are produced in large quantities and are included in many types of products. The consumption of consumer textile products is high and in 2008 the net inflow of clothes and household textiles reached an average of approximately 15 kg per person in Sweden (Carlsson et al. 2011). From the year 1999 to 2009 the private consumption of clothes and shoes in Sweden increased with more than 50 per cent (in value terms), coupled with small increases in consumer prices, which indicate a large growth in the volume consumed (Konsumtionsrapporten 2010). There are no indications of a downward trend in the consumption of textile products in the foreseeable future.

Large quantities of chemicals are used in the manufacture of textiles. Some are harmful to the human health and/or the environment, while others are currently not considered to have hazardous properties. Some of the chemicals used in the manufacture and finishing of textiles may remain in the final textile product, intentionally or unintentionally, when the products reach the consumer. It is difficult to know exactly which chemicals are present in the textiles since the supply chains are long, complex and global. Information regarding chemicals in textiles is therefore often decreasing when going down the supply chain. Many textiles companies require their suppliers to comply with so called Restricted Substances Lists (RSLs). Different companies may have different requirements and it is problematic, in particular for small importing companies, to ensure that their demands are fulfilled by suppliers and sub-suppliers.

Textiles make up a very broad category of products and are used in a way that consumers, including children, are directly or indirectly exposed to their chemical content. Chemicals in textiles can have adverse effects by directly affecting health, such as causing allergic reactions. But they can also adversely affect the environment, for example by long term effects from persistent or bio-accumulating substances.

To deal with the problems posed by hazardous chemicals in textiles, there is a need for regulation of chemical content in textile products at the EU level.

1.1 The assignment

The Swedish Chemicals Agency (Kemikalieinspektionen) has been assigned by the Swedish government to further develop the idea of a coherent piece of EU legislation on hazardous chemicals in textiles. The report to the government shall include the following;

- A review of the hazardous chemicals that may be present in textiles
- An evaluation of the risks that hazardous chemicals in various textiles present
- A negative list of chemicals that should be limited in textiles
- A legislative proposal for a regulation at EU level
- The proposal for legislation should be accompanied by an impact assessment, in the parts that are possible to analyse within the frame of the assignment.

The assignment should be made in dialogue with the textile industry and in consultation with the Swedish Environmental Protection Agency and the Swedish Consumer Agency.

The Swedish Chemicals Agency was given the assignment on 20 December 2012 and shall report the results to the government (Ministry of the Environment) not later than the 12 April 2013.

The objective of the assignment was to continue where the Swedish Chemicals Agency's report 1/12 "Improved EU rules for A Non-Toxic Environment" ended. One conclusion from that report was that chemicals in textiles are not sufficiently controlled and that a more complete harmonised regulation is required at EU level.

In conjunction with the 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, the European Commission has been given the task to review the issue of allergic substances in textiles and to report on this by September 2013. There are currently no environmental and health requirements concerning textiles in the regulation. The regulation is already known and practiced by the textile industry, which is an aspect that makes it appealing as a regulatory tool to target the issue of chemical content in textiles. It would likely be beneficial to combine such a regulation with the current fibre labelling regulation if chemical content in textiles is to be regulated, since it would provide one common piece of legislation for the textile sector to comply with.

In this report the Textile Fibre Regulation (EC) No 1007/2011 is therefore presented as our main option to be assessed, but other alternative ways to regulate chemicals in textiles are discussed as well.

1.2 The purpose of this report

One objective of the Swedish Chemicals Agency is to protect people in their everyday lives from direct and indirect exposure to hazardous substances in products, including textiles. This applies particularly to sensitive and vulnerable groups such as children and people who in their professions handle large amounts of textile goods. It concerns primarily substances that are carcinogenic, mutagenic, toxic to reproduction (CMR substances), substances that may cause sensitisation by skin contact or by inhalation and substances that can cause disruptions in the endocrine system. Another objective is to prevent chemical residues in textile products from causing long term adverse effects in the aquatic environment and accumulation in the environment.

An EU specific regulation for textiles, would simplify the European textile industry's work to set common standards for suppliers, as well as facilitate risk reduction efforts. The preferred situation is that no textile products containing hazardous substances are made available on the internal market of the EU. In order to reach this goal it is considered essential to agree on a comprehensive EU regulation on chemicals in textiles.

1.3 Scoping of textiles and hazardous chemicals

In this report, the wording 'textile product' is used, as defined in the Textile Fibre Regulation (EU) No 1007/2011. In the sections where REACH is described, the wording 'textile article' is used in the same meaning. Thus, in the context of this report 'textile product' and 'textile article' are the same.

Textiles
The term "textiles" is broad and it is necessary to define what kinds of textiles that are targeted in the assignment. In this report reference is made to how textile products are defined in article 3.1 a-f of the Textile Fibre Regulation (EU) No 1007/2011. This Regulation is currently aiming at marking textiles to indicate the textile fibres included in the product and it is already practised by the European textile sector.

Hazardous chemicals
Chemicals may have many kinds of hazard properties; some are corrosive, some affect the neurological system etc. Therefore, when using the term "hazardous substances", it is important to define which hazardous properties these substances are supposed to have.

For the purpose of this assignment the Swedish Chemicals Agency has chosen to use the most severe classifications according to the CLP Regulation (EC) No 1272/2008 to define the term hazardous substances in textile products. The health classifications chosen are: Carcinogenic, Mutagenic, and Toxic for Reproduction; Category 1A and 1B, which means that the chemicals have been shown to be carcinogenic, mutagenic, or toxic for reproduction in humans or in animal tests. Substances with such classifications are highlighted in the Swedish environmental objective "A Non-Toxic Environment" and in the REACH Regulation (EC) No 1907/2006. They are also considered as particularly hazardous and are therefore not allowed in chemical products sold to consumers (see REACH, Annex XVII, entry 28-30) and should thus not be included in textile products. The Swedish Chemicals Agency is of the opinion that endocrine disrupting[2] chemicals (EDCs) should be treated equal to those substances that are classified as CMR (1A or 1B) and EDCs should therefore be included in the group of hazardous substances that should not be allowed in textiles, as soon as criteria for the identification of substances with endocrine disrupting properties have been developed. Such criteria are required under the Plant Protection Product Regulation and the Biocidal Products Regulation by December 2013. The Commission is to review the way EDCs are authorised under REACH by June 2013.

In the scope of this report the Swedish Chemicals Agency has chosen only to include the harmonised classified substances of the CLP Regulation (EC) No 1272/2008 and not the self-classified substances of the same regulation. The database Classification & Labelling Inventory contains classification and labelling and provides information on notified and registered substances received from manufacturers and importers, and is available on the ECHA website[3]. From a safety perspective it would have been desirable also to include self-classified substances. From an enforcement perspective, however, such an approach is problematic, since different companies may reach different conclusions. The data sets used for classification may differ from one company to another. From a consumer perspective the

[2] The criteria do not refer to the classification criteria of CLP. They refer to the EU Commissions´ work with identifying criteria for EDCs, which can be found in the draft outline of the EU Commission.
[3] http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory

most apparent and direct health impact from hazardous chemicals in textiles is allergic reactions caused by skin contact. Sensitising substances, i.e. skin sensitising and respiratory sensitising substances, are therefore included in the proposed scope of substances to be regulated.

Environmental exposure may occur both during production and later on during consumer use of textiles through leaching via washing or when the textile is disposed of. For protecting the environment, we have included the most severe classification category: Aquatic Chronic 1. It should be noted though that this does not cover for example vPvB (very Persistent and very Bioaccumulative) substances that may in the individual case be of similar or even higher concern for the environment than a substance classified as Aquatic Chronic 1.

With respect to protecting the environment the Swedish Chemicals Agency thus consider it justified to also cover already identified PBT (Persistent, Bioaccumulative and Toxic) and vPvB (very Persistent and very Bioaccumulative) substances. With respect to protecting health and the environment the Agency also considers it justified to cover already identified substances for which there is scientific evidence of probable serious effects to human health or the environment which give rise to an equivalent level of concern to those of CMR (1A or 1B) or PBT or vPvB. There are a few such substances on the present Candidate List in REACH that don´t fall for the above mentioned classification criteria but which are currently known to be used in the production of textiles, and these substances are included in the scope of hazardous substances in the report.

Another way to include the above-mentioned substances on the Candidate List could be to make a reference to the list in the Fibre Labelling Regulation. However, this would give the Candidate List a new function as a list of restricted substances which would probably complicate further amendments of the list. For that reason the Agency has chosen the proposed solution, with certain substances from the Candidate List included as restrictions in the regulation.

With respect to any such substances further added to the Candidate List, fulfilling the present or any future SVHC criteria, the Agency therefore considers that any addition to the Regulation of chemical content in textiles must be carried out on a case-by-case basis, using a comitology process.

In the same way as for SVHC substances, other hazardous substances, such as CMR category 2 and self-classified substances can be included on a case-by-case basis in the scope of the regulation using the procedure of comitology.

1.4 Delimitations

In this report the Swedish Chemicals Agency presents a regulation on a EU level, focusing on hazardous chemicals that remain (intentionally or as impurities) in textile products. Biocide products used in textiles are not included in the proposed regulation. Biocides are covered in the Biocidal Products Regulation (EU) No 528/2012 that will enter into force on 1 September 2013.

Even though the largest impacts, on both health and the environment, usually occur in the countries where textiles are manufactured, the use of hazardous chemicals in the production of textiles is not explicitly covered by the regulatory proposal in the report. The Swedish Chemicals Agency does not see it as currently feasible to regulate or control industrial

activities that occur outside the Union and any regulation on chemicals in textiles should therefore be aimed at the final product that is placed on the market in the EU.

There are currently several ongoing initiatives in Sweden and the Nordic countries as well as other EU Member States to improve the resource efficiency in the handling of textiles and textile waste[4] (Swedish Environmental Protection Agency April 2013). As mentioned in the introduction in this report the consumption of textiles has increased rapidly in recent years. This fact, along with the environmental impact from production of textiles, makes it urgent to introduce measures to improve the resource efficiency throughout the whole lifecycle of textiles. One measure that has been mentioned is the possibility to introduce an Extended Producer Responsibility (EPR). EPR is a policy principle that promotes total life cycle environmental improvements of a product by extending the responsibilities of the manufacturer of the product to various parts of the product's life cycle. EPR-based policies seek to provide incentives to the manufacturers to consider, already at the design phase of the product, how they could reduce environmental impacts arising from the end-of-life phase of their products. Benefits by introducing an EPR policy for textiles could for example be: improved product design and effective collection and recycling of used textiles. Examples of possible instruments in an EPR policy could be: restriction of certain chemicals, recycling targets, take-back obligation and requirements on recycled material content. However, since the discussions about an EPR policy for textiles are at a very early stage, and this type of policy is broader than the scope of the assignment given to the Swedish Chemicals Agency, the option of EPR has not been evaluated per se and the reduction of environmental impacts arising from the end-of-life phase of textiles is not among the main objectives in this report. Though, the regulation that is proposed in the report would most likely contribute to the achievement of some goals of a possible future EPR.

A list of chemicals that may be present in textiles, and a subset list of hazardous chemicals that may be present in textiles and which should be restricted (presented in Annex 3), have been prepared. However, due to the short time frame given in the assignment only a qualitative assessment of exposure to humans and the environment has been performed. This means that the risk evaluation for specific chemicals in textiles required by the government has not been finalised. Instead the Agency has decided to use an approach based on intrinsic hazardous properties.

The Swedish Chemicals Agency has focused on the pure textile material of the final product including prints with PVC and other prints on textile, since the printed surface can be seen as an integrated part of the textile material itself. Also coatings and laminated films and membranes that can be seen as integral parts of textiles such as plastic coated terry, are included in the scope of textile materials. The proposed regulation does not include other material parts as for example metals in buttons, zippers or other details of metal or plastic on the textile.

The dialogue with the textile industry has been focused on Swedish textile producers, importers and retailers, but a selected number of European level stakeholders have also been asked to provide input to the assignment. The impact assessment of the proposed regulatory option is made in a simplified and qualitative manner, primarily based on the input received by the Agency during stakeholder consultation.

[4] Personal communication with Elisabeth Österwall and Sanna Due at the Swedish Environmental Protection Agency April 2013

2 Chemicals in textiles

The process from fibre to finished textile is long and includes many steps in the textile production. Fibres and textiles are treated in a variety of chemical processes. In each step of the process, different chemicals are used for different purposes.

There is a great variety of chemicals that can be used in textiles. Pesticides and fertilisers are frequently used in natural fibres production. Other chemicals used in textile production include chemicals in dyes, processing chemicals, water or stain repellents, performance-enhancing coatings or treatments, flame retardants etc. Some of these chemicals are designed to remain within the finished product, whereas others are present as a carry-over from the manufacturing.

2.1 The textile manufacturing process

The production of a textile starts either from natural fibres (for example wool and cotton) or from the production of man-made fibres (for example polyester and viscose). Mixed materials are also common. The next step is the production of yarns from the natural or synthetic fibres. Fabrics are produced of the yarns/fibres by different technologies (weaving, knitting, non-woven technologies, braiding, tufting) (Best Available Techniques in Textile Industry 2003).

The finishing processes, which includes several steps (pretreatment, dyeing, printing, and finishing) then follows. Some textiles are coated or laminated. These process steps are not always in the same order. Dyeing, for example can be carried out on loose fibres, on yarns, on fabrics, and on readymade textiles. The make-up (cutting, sewing and assembling) is the last step before selling in retail trade or whole trade and consumer use. Figure 1 describes a generalised picture of the textile process. Since most chemicals are used in the finishing step, focus is on this part of the process.

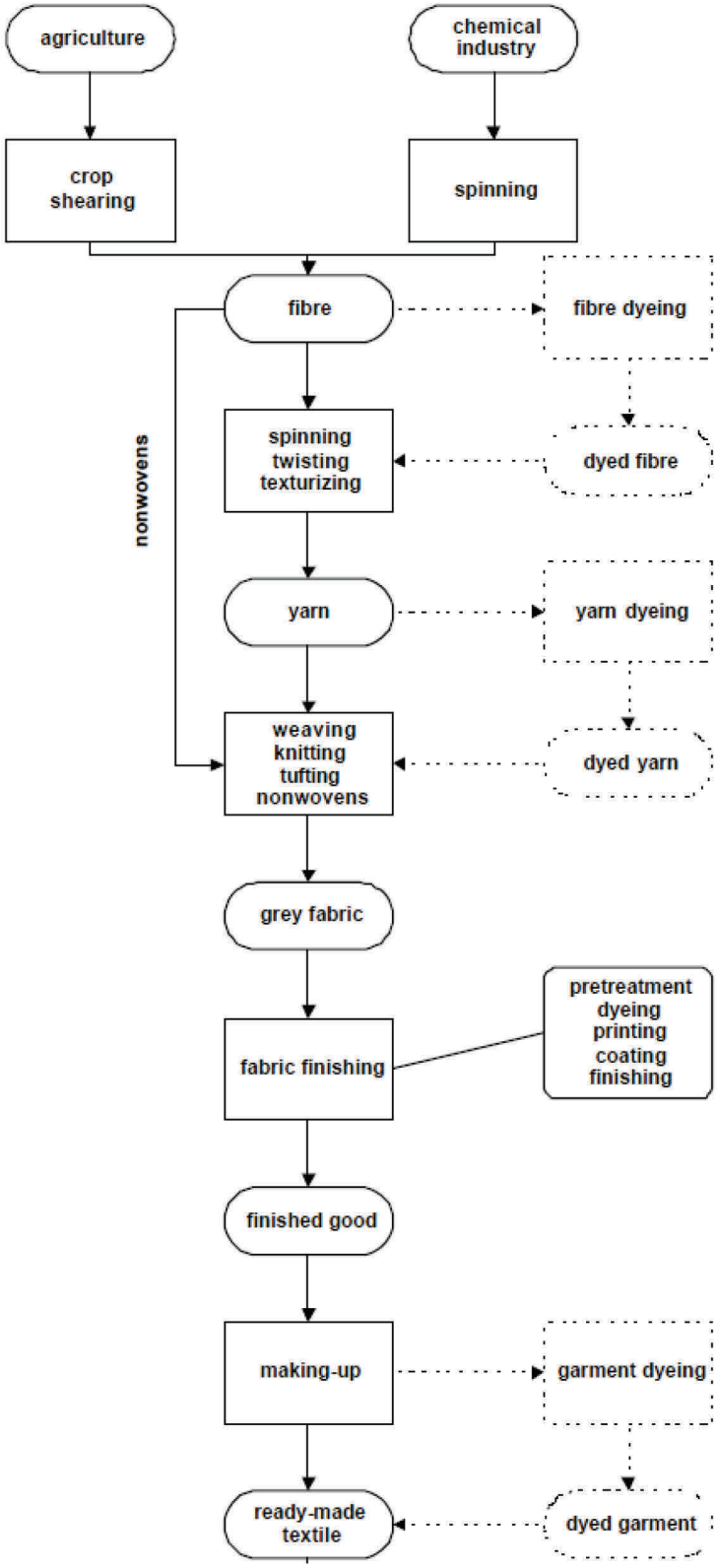

Figure 1. A simplified schematic picture of the textile manufacturing process.

Pre-treatment
In the pre-treatment steps, natural impurities on the textile raw material are removed. These impurities include by-products on cotton, such as waxes, proteins etc.; vegetable impurities on wool and by-products from upstream production steps (preparation agents; sizing agents etc.) and fibre specific by-products from man-made fibres (monomers, fibre solvents).

Pre-treatment is a key factor for all subsequent finishing steps, since this step prepares the textile and gives a better result for the following dyeing process. Mechanical, wet, and thermal pre-treatment steps are used. The choice and sequence of processing steps are substrate specific (cotton, wool, man-made fibres, woven or knitted fabric, etc.)

Poor pre-treatment generates problems with quality and sometimes require re-work as a consequence. Besides the cleaning effect, pre-treatment has an effect on the fibre properties, such as:

- Absorption of dyes and textile auxiliaries increases.
- Tensions in textiles are minimised; the dimensional stability is improved.
- Wettability of the material is improved.
- Mercerisation gives a change in crystallinity of the cellulose; the lustre is improved.
- Bleaching increases the whiteness of the substrates (important for undyed fabrics as well as for fabrics dyed in light shades or with a high brilliance).

Dyeing
When dyeing, textiles are brought into contact with aqueous dyestuff solutions, a great variety of chemicals (salts, acids, etc.), and dyeing auxiliaries (surfactants, dispersing agents, levelling agents, etc.). The type and the quantity of dyes, chemicals and auxiliaries are substrate specific and depend amongst others on the product quality (e.g. fastness properties). Colourising with dyes is based on physico-chemical equilibrium processes, namely diffusion and sorption of dye molecules or ions. These processes may be followed by chemical reactions in the fibres. Dyeing can be carried out by different techniques; continuous, semi-continuous processes or batchwise (exhaust dyeing). These different techniques will not be described in this report.

Printing
Besides dyeing, the colourisation in textile industry is made by means of printing technologies, mainly used for multi colour patterns. The dyes are dissolved in a limited amount of water to which a thickening agent is added to give the necessary viscosity to the printing paste. The printing process is followed by a drying and steaming process, or, in the case of pigment printing, a curing process. Thereafter, a washing and subsequent drying step follows (except from in pigment printing).

Approximately half of textile printing is done with the pigment printing technology. The pigments used have no affinity to the fibre. Therefore, a binder and fixating agent must be added to the printing paste. The advantage of pigment printing is that the process can be done without a washing step needed for all other printing technologies. A typical printing paste recipe for pigment printing contains water, emulsifier, thickening agent, pigment dispersion, softening agent, binder and fixation agents.

In printing, the main ecological impact is caused by the washing process of the printed textile (with the exception of pigment printing), the residual printing pastes and by the cleaning procedures of printing equipment and printing blankets.

Finishing
The finishing step improves the functionality and may facilitate care of the textile. Some finishing processes are specific for a special substrate, for example easy-care finishing on cotton, and antistatic finishing for textiles made of man-made fibres. This step may include different treatments, both chemical, mechanical (gives a special brightness to the textile) or physical. For the purpose of this report, the focus is on the chemical treatment.

Auxiliaries and chemicals
Some chemicals and auxiliaries are only used for better processing in textile finishing (e.g. levelling agents, salts, complexing agents, detergents). These are introduced into the water path in the wet processes. Other chemicals and auxiliaries create an effect on the textile and are fixed in a chemical/physical way on the fibres. Yet other substances (e.g. reactive dyes, crosslinking agents) react during dyeing/finishing.

The table in Annex 5 gives an overview of the variety of textile auxiliaries and chemicals used in textile fabric finishing (where the pretreatment steps are dyeing, printing, coating, finishing) their effects and their chemical compositions.

The chemical processes in textile finishing
There is often a mixture of different auxiliaries applied in one padding process to create a multifunctional effect. Some examples of finishing effects of interest are:

- Easy-care (improvement of crease and shrink resistance)
- Softening
- Filling, stiffening
- Repellents (oil, water, and soil repellents)
- Flame retardants
- Antistatic finishing
- Non-slip finishing
- Anti-microbiotic finishing

The emission to air at finishing consists of volatile substances either from impurities/by-products, residual solvents, monomers or the auxiliaries themselves. Wastewater loads consist of highly concentrated residual liquors from the padding equipment, mainly of substances with low rate of biodegradation. Furthermore, residues from upstream processing steps (preparation agents from spinning and fabric production, auxiliaries/chemicals and their by-products used in dyeing and printing) can be found in the effluents.

2.2 Overview of hazardous chemicals that may be present in textiles

The assignment required a review of the hazardous chemicals that may be present in textiles. First, a mapping of all chemicals which are known to be used in textile production was conducted. Then, hazardous chemicals that may be present in the final textile product were listed.

The list was compiled from several sources:

- Swerea IVF chemical database[5] of substances that may be found in textiles (about 250 substances)
- The Swedish Chemical Agency´s Commodity Guide[6](about 400 substances)
- The Swedish Chemical Agency´s Products Register, to which manufacturers and importers are obliged to report products subject to chemicals control (about 530 substances, including 130 confidential substances)
- A number of restricted substances lists from different Swedish companies and from international voluntary initiatives[7], also including the Virke[8] list (about 500 substances in total)
- The draft report (Study on the Link Between Allergic Reactions and Chemicals in Textile Products 2013) on the study on the link between allergic reactions and chemicals in textile products' have also been included (about 330 substances).

It should be noted that the mapping of chemicals is non-exhaustive and can only give a rough estimate of the number of chemicals which are used in the textile production. There are many chemicals which are regarded as confidential by the manufacturer, which makes it difficult for the textile manufacturer to find this information. For example, in the Swedish Chemical Agency´s Products Register[9], 130 chemicals are found which cannot be disclosed to the general public for confidentiality reasons. It should also be noted that the Agency's Products Register only contains a small quantity of all the chemicals used in textiles, since the market for textile manufacturing in Sweden is very small.

There is a consumer market in the EU for chemical products which are used in the care-taking of the final textile product, e.g. for impregnation. Here too, trade secrets are common with regard to the chemical ingredients of the chemical product. Companies preparing chemical mixtures very seldom give out the exact recipe of the chemical mixture. In order to find the information on all chemicals used in textile production, companies would need to disclose the information on the chemical substances they produce or use in chemical mixtures[10] (Swerea IVF Stefan Posner March 2013).

From the chemicals known to be used in the textile production, a selection of hazardous chemicals has been made based on the criteria described in Chapter 1.3. An overview of the selected classification of hazardous substances included in this report is found in Table 1 below.

[5] Swerea IVF is a research institute within the Swerea group dealing with materials, processes and production systems within manufacturing and product development as key areas.
[6] A database on the composition of goods. The Commodity Guide database gives estimates of the materials and substances that may exist in various products in Sweden. It also shows the quantity of goods, materials and certain substances.
[7] Of the voluntary initiatives are among other initiatives the AFIRM Group included. The Roadmap to Zero Discharge has not been included, but may partly be included in the companies' own lists.
[8] A report developed by the Norwegian organisation, Virke together with the textile industry http://www.virke.no/dav/aa2876d754.pdf
[9] http://www.Kemikalieinspektionen.se/en/Start/The-Products-Register/
[10] Personal communication with Stefan Posner at Swerea IVF March 2013

Table 1. Health and environmental hazardous substances included in this report according to Regulation (EC) No 1272/2008 (CLP) and endocrine disrupting substances.

Health hazardous substances	**Environmental hazardous substances**
Carcinogenic category 1A/1B	Environmentally hazardous, long-term effects Aquatic Chronic 1
Mutagenic category 1A/1B	
Toxic to reproduction category 1A/1B	
Respiratory sensitisation 1A/1B	
Skin sensitisation 1A/1B	
Endocrine disrupting substances /(EDCs), at present not covered by any harmonised classification	

The Swedish Chemicals Agency is of the opinion that, from a regulatory perspective, EDCs should therefor automatically be regarded as substances for which it in practice is not possible to determine safe threshold concentrations. EDCs should be treated in the same way as substances classified as CMR (1A or 1B) and should therefore be regarded as hazardous substances. The European Commission will present criteria for identification of substances with endocrine disrupting properties by the end of this year.

In total, the non-exhaustive list contains around 1,900 chemical substances that are known to be used in textile production. This list indicates that there are a very large number of chemicals used in textile production today. Yet, these mapped chemicals only make up a part of all chemicals used; for example many chemicals are considered confidential and therefore unknown to the general public.

Of the around 1,900 substances, 165 chemical substances have been identified to have harmonised classifications in one or several of the classifications described above. A breakdown of the list, results in substances in different harmonised classification categories and substances on the REACH Candidate List as follows:

- Carcinogenic substances: approximately 59 substances.
- Mutagenic substances: approximately 9 substances .
- Substances toxic to reproduction: approximately 39 substances.
- Allergenic substances: approximately 14 substances with respiratory sensitisation properties and approximately 56 substances with skin sensitisation properties.
- Substances with environmentally hazardous, long-term effects: approximately 57 substances.
- Substances without the harmonised classifications but which can be found on the REACH Candidate List: 24 substances.

The list can be found in Annex 3 of this report. The list includes substances that may be present as such or which are represented as transformers that may derive from related substances used in textile processes. Of the approximately 165 substances, some 69 of the substances have more than one classification whereas 96 substances have only one classification.

Approximately 1,750 of the 1,900 chemicals in the non-exhaustive list are not classified for the hazardous properties to be focused on in this report (see the classifications mentioned in Table 1 above). However, they may still have such properties that they should be considered for restriction on a case-by-case basis (e.g. EDCs).

When comparing the substances that belong to the classifications in this report with the Restricted Substance Lists (RSLs) from Swedish companies and the RSLs from of some voluntary initiatives (the RSL of the AFIRM Group[11], the RSL of AAFA[12] and the RSL of Virke[13]), it was evident that most of the substances are listed either in the companies´ RSLs or in the voluntary initiatives. The only exception to this is for Skin sensitising substances, where only around half of the Skin sensitising substances can be found in the RSLs or voluntary initiatives. This indicates that the voluntary initiatives and the textile companies in general have selected similar substances as the Swedish Chemicals Agency in this report.

Another observation that was made, when comparing the chemical lists from the Swerea IVF database and the Swedish Chemicals Agency´s Commodity Guide[14], is that there are only about 50 chemical substances of more than 600 substances which are the same for the two databases. This also indicates that the inventory of textile substances cannot be considered as exhaustive.

2.3 Identification of chemical residues in textiles

As already mentioned, many chemicals are used in the textile manufacturing process, and only a fraction of these can be found in the finished textile. In most cases, the kind of chemicals found in the finished textile depends on the specific physical and chemical properties of the chemical. Most chemicals in the finished textile derive from the dyeing/printing and finishing during the manufacturing process (Swedish Chemicals Agency report 5 1997).

There should not be any measurable quantities of process chemicals remaining in the finished textile, but unfortunately sometimes there are. Residues may for example depend on limited water solubility or persistent parts of the chemical.

The functional chemicals that are used should have good compatibility, such as good solubility in the materials. Other chemicals require good affinity attraction to the fibres, for example as dyes in cellulose. Common to all functional chemicals is that they should have the

[11] The AFIRM Group is a recognised global center of excellence, providing resources for sustainable, self-governing RSL implementation across the apparel and footwear supply chain.
[12] The American Apparel & Footwear Association.
[13] The Norwegian organisationVirke together with the textile industry.
[14] A database on the composition of goods. The Commodity Guide database gives estimates of the materials and substances that may exist in various products in Sweden. It also shows the quantity of goods, materials and certain substances.

most favourable ageing characteristics possible in order to sustain the desired function in the final textile product during the usage phase (Swerea IVF Stefan Posner, March 2013).

The properties of the chemical may influence the extent to which a chemical remains in the textile product, for example:

- Normally, substances with good chemical water solubility are removed in the washing steps (with some exceptions)[15].
- Volatile substances, with free passage, evaporate in the treatments up to finished textiles.
- Normally, auxiliary chemicals should be removed after use. The function of these is to facilitate certain processes without being incorporated in the material.
- Certain process chemicals should be removed after use or degrade during the process, for example bleaching agents.

This means that most surfactants, i.e. detergents, emulsifiers and other water-soluble chemicals such as inorganic salts, alkalis, acids etc., are normally washed out, provided that washing is performed and is effective. This is, however, not always the case.

Textile analysis
To identify which chemicals that might be present in different finished textiles, the Swedish Chemicals Agency made a survey of textile analyses during the years 2005-2012, resulting in a total data set of 13 different references summarised in Annex 6. It is important to point out that the tests referred to have focused on specific chemicals, mainly regulated chemicals. Nevertheless, they can occur in fabrics and sometimes in relatively high concentrations. Textiles can indeed also contain other hazardous substances not tested for, or even reaction substances.

Annex 6 provides the chemical substance with CAS number. The substances found were perfluorinated compounds, phthalates, heavy metals, flame retardants, isocyanates, organic tin compounds, antibacterial substances, free arylamines from disperse dyes, allergenic disperse dyes. Also a few other organic compounds, such as formaldehyde, nonylphenol ethoxylate, 2-ethylhexanoic acid, urea, various glycols, dimethyl pyridines, aliphatic hydrocarbons were found in textiles.

Most of the analysed products were t-shirts, towels, sheets, jackets and furniture textiles. As children are a vulnerable group of consumers many of the analyses were in particular targeted to find hazardous substances in textiles for children.

A brief description of how the chemicals are used is given in the Annex 5. The main part of the substances analysed are used as, dyestuffs, softeners or stabilisers in the process.

3 Exposure to chemicals from textiles

Due to the limited time available in this assignment, it has not been possible to evaluate the exposure and risks of individual chemicals associated with consumer use of textiles.

[15] This means that the chemical substance can be washed out from the textile in the production country prior to reaching the final consumer or by being washed out by the final consumer

Therefore, this chapter contains only a qualitative exposure assessment for humans and the environment.

3.1 Human health exposure

Chemicals that are used in the manufacture of textiles can lead to exposure of workers at the production facility and can also be emitted to the environment. In this report there is no particular focus on the production stage, but if the content of hazardous chemicals in the produced textiles is minimised, much of the exposure in the production process is likely to be avoided.

When textiles are used by consumers, direct exposure mostly takes place via the skin, but chemicals from textiles might also cause emission to the indoor environment, leading to indirect exposure. This indirect exposure can occur through inhalation of the chemicals found in the air (possibly adsorbed to very small dust particles), or by chemical-containing dust particles, which for example may contaminate the hands. Absorption via the skin may occur but is usually negligible compared to the absorption which can occur when contaminated hands or food are placed in the mouth. Dust exposure is highest for small children crawling on the floor and then putting dusty hands in their mouths. Since many fabrics are washed regularly, chemical residues in textiles may also lead to emission to the environment through the washing water. Many of the chemicals that are present in the wastewater originate from textiles but it is not yet possible to take care of these in the sewage plant. Thus, some chemicals that end up in the aquatic environment can be absorbed by fish and lead to secondary exposure to humans via the food.

Direct dermal exposure via textiles
Direct exposure to chemicals in textiles through the skin may occur, which thus may contribute to the appearance of adverse health effects. Many people have problems due to the presence of allergenic chemicals in textiles. In a study from southern Sweden, performed during the years 1999-2003, patch-testing of over 3,000 individuals using a textile dye mix (consisting of eight disperse dyes) revealed a frequency of contact allergy of 1.5 per cent to this mix of dyes (Ryberg et al 2006). This frequency is similar to what had been found in earlier studies from southern Europe. A very recent review (Malinauskiene et al 2013) on contact allergy by disperse dyes showed that for three dyes (Disperse Blue 106, Disperse Blue 124 and Disperse Orange 3) the average prevalence in screening studies was more than 1 per cent, i.e. at least every hundred person is allergic to these dyes. For most disperse dyes, data on the prevalence of contact allergy in humans is missing.

However, it can often be difficult to evaluate whether it is the textiles themselves that are the cause of the problems, since allergens can also be added to textiles from detergents.

Direct exposure of the skin occurs particularly if a garment is worn in direct contact with the skin. The absorption of chemicals through the skin is normally limited, but not non-existing. For substances with strong allergenic properties it may suffice with a small uptake of the substance into the skin cells for an allergic reaction to be triggered. High temperature and body moisture are factors that may increase absorption. With chemicals that are volatile, skin exposure can occur under some conditions, even if there is no direct contact between the textile and the body. One example is dimethyl fumarate, which for a period was used as a biocide to prevent mold problems in transports. This led to severe allergic problems for

certain individuals who had been sitting in armchairs that contained small bags with dimethyl fumarate.

Direct exposure to children by sucking on textiles
Small children are prone to put things in their mouths (such as comforters and clothes) and it is therefore particularly important that hazardous chemicals are absent from textiles that it is easy to suck on, including textile tags.

Dermal and oral indirect exposure via indoor dust
Chemicals can also disperse from textiles to the indoor air, where they can bind to dust particles. Even more important as a source of exposure are textile fibres detached from textiles (clothing, furniture, etc.) during use. Textile fibres that may contain chemical residues make up a large portion of the dust that we have in our homes. For example, flame-retardant textiles have been shown to be a source of flame retardants in the indoor environment. Impregnation of furniture and outdoor clothing can also be a source of perfluorinated waterproofing products (e.g. PFC) found in indoor dust. The largest dust exposure probably occurs by putting dusty hands in the mouth, but additional small contributions are through inhalation of dust particles and dermal exposure via dust. For small children indoor dust is believed to be the largest single route of exposure to brominated flame retardants and PFC (Björklund 2011).

Oral indirect exposure through food
For a small number of chemicals, use in textiles can lead to pollution of the environment, e.g. through the washing of textiles (e.g. nonylphenol ethoxylates) but also via direct distribution in from textiles to indoor air and from there to the outside air (brominated flame retardants). In the aquatic environment, these chemicals can then accumulate in fish and cause contamination of important food products. Examples of chemicals that behave in this way are brominated flame retardants and PFC. These chemical groups have received considerable international attention, leading to restrictions on many of them, for example in the Stockholm Convention.

Quantitative exposure estimation
In general, it is difficult to foresee which substances and exposure pathways that are most important for consumers in relation to textiles. As an example, many years of research in many countries has led to the quantitative knowledge we have today of a few chemical groups (such as brominated flame retardants and perfluorinated substances). In this assignment there has neither been sufficient time, nor sufficient knowledge, to carry out quantitative exposure and risk assessments for the use of individual chemicals in textiles.

3.2 Environmental exposure

In general, environmental exposure of chemicals due to consumer use of textiles will mainly occur during leaching via laundering, and when the textile becomes waste and are disposed. All situations involving consumer treatments of the finished textiles such as home-dying or bleaching are also considered to result in environmental exposure of the chemicals used. Household dusts which contain textile fibres will via disposed vacuum cleaning dust bags also be a potential source of exposure.

In case of leaching via laundering and/or consumer handling such as dying or bleaching of the textiles, the chemicals will enter the water and the organisms in municipal sewage treatment plants (STPs) and the aquatic ecosystems will be exposed. In addition, application of sludge

from the STPs on soil may result in an exposure to organisms in the terrestrial ecosystems and an uptake of the chemicals into crops grown on the soil, which may result in an exposure of humans via food.

In case of waste disposals, the chemicals will mainly expose organisms in the terrestrial ecosystems, but may via leachate also expose aquatic organisms. If the waste is incinerated, all ecosystems may be exposed to the combustion gases and the ashes produced may contaminate landfills.

A more specific and detailed description of the environmental exposure situation will depend on the specific chemical in question.

3.3 Previous exposure assessments

In Annex 4 of this report, 54 chemicals for which there exists risk assessments that were performed during the Existing Substances Regulation (EEC/793/93) are listed. The exposure assessments related to consumer use of textiles are described in this Annex.

As can be seen, exposure and risk assessments of the consumer use of the chemicals in textiles were quite rare and risks for consumers were seldom identified in the few risk assessment that have been conducted so far. This does, however, not rule out that such risks exist for other chemicals, such as chemicals listed in the non-exhaustive list of Annex 3.

4 Legislation on chemicals in textiles and voluntary initiatives

Today, there is a lack of overall legislation at EU level to regulate negative effects on health and the environment from chemicals in textile products and there are only a few regulations that cover specific chemicals in textiles. Still, there are several different pieces of legislation that either regulate different parts of the life-cycle of the textile or have different focus on substances that may to some extent be used in the textile manufacturing process. Among regulations, the REACH regulation includes most restrictions of hazardous chemicals, but REACH was not specifically made to account for chemicals in products, such as textiles.

There are also a number of voluntary initiatives which aim at reducing hazardous chemical in the textile process and in the finished product. The most common voluntary labelling and initiatives are briefly described later in this chapter.

4.1 Legislation directly linked to substances in textiles

REACH

The REACH Regulation (EC) No 1907/2006[16], is an EU wide chemicals regulation. The overall aim of REACH is to ensure a high level of protection of human health and the environment, as well as free circulation of chemicals on the market while enhancing competitiveness and innovation. In REACH it is important to distinguish between substances, mixtures and articles/products. Most of the requirements in REACH concern substances as

[16] EUT L 396, 30.12.2006, s. 1 (Celex 32006R1907).

such or in mixtures. There are only a few restrictions on substances in, for example, textile products. Annex 7 includes a summary of chemicals that are restricted in textiles or which are on the candidate list and linked to textile products. About ten of these substances may not be used in textile products. Some of them have more detailed restriction rules, for example restrictions applicable only to textile products intended to come into contact with the skin.

REACH covers registration, evaluation, authorisation and restriction of chemicals. During the registration procedure, manufacture or import of chemicals in quantities of 1 tonne or more per year and legal entity needs to be registered at the European Chemicals Agency (ECHA). The registration of substances and their uses should include use in articles when relevant. Upon registration in volumes above 10 tonnes per year, a chemical safety assessment is to be done which includes the life-cycle approach of the chemical, including risks from its use in articles. The assessment intended to lead to a safe use of the substance including its use in articles.

ECHA has developed a list of chemicals that may be subject to authorisation - the candidate list. Identification of substances that may be included on the candidate list is a continuous process, which means that new hazardous substances are added to the list gradually. Today there are 138 substances on the list. Chemicals that may be suggested to the candidate list are substances that have properties that can cause serious and long lasting effects on human health and the environment, known as particularly hazardous substances[17] or Substances of Very High Concern (SVHC).

Once a chemical has been added on the candidate list, it will have consequences for the substance both in the short and long term. In the short term, there is a requirement for communication of information of presence in articles (if the chemical is included in articles in a concentration exceeding 0.1%), according to REACH, Article 33.

In the long term, the candidate list will be used by many textile companies as a “prohibition list” and SVHC chemicals will therefore in several cases obviously be phased out. Several substances on the list are used in the textile process but do not remain in the finished article.

The European Commission has set up an aim to make a roadmap for the candidate list, which is to have all relevant, currently known SVHCs included in the candidate list by 2020. Criteria have been developed for selecting relevant substances to consider for inclusion.

Candidate list substances that after a prioritisation and a comitology procedure have been included also in Annex XIV of REACH may after the set sunset date not be placed on the market or used without an authorisation from the European Commission. Before authorisation is applied for, a safer alternative chemical or other technology should always be considered. If the alternatives are economically or technically feasible, the hazardous chemical should be replaced. In that way, the chemical substances concerned will gradually be reduced in textile products.

[17]The criteria for classification as Carcinogenic, Mutagenic or toxic for Reproduction category1 or 2 in accordance with Directive 67/548/EEC on the classification and labelling or 1A and 1B of the CLP Regulation (Regulation (EC) No 1272/2008). The criteria for being considered as persistent, bioaccumulative and toxic (PBT) or very persistent and very bioaccumulative (vPvB) in accordance with the criteria in Annex XIII of REACH. Or have other serious features such as endocrine disrupting properties.

The normal restriction procedure (according to article 68(1) in REACH) is the most established procedure for restricting the use and marketing of chemical substances. This procedure includes a so-called Annex XV dossier, made by a Member State or by ECHA on assignment by the European Commission. The prohibitions or restrictions are listed in Annex XVII of the REACH Regulation[18].

Stockholm Convention
The Stockholm Convention on Persistent Organic Pollutants (POPs) is a global treaty with the objective of protecting human health and the environment from POPs. The currently 178 parties are required to take measures to eliminate or strictly reduce the intentional production and use of listed POPs. The obligations to a large extent include control measures, to minimise unintentional production of POPs and releases from stockpiles and wastes. When the Convention was agreed in 2001, 12 substances were listed and most of them were pesticides. In 2009, the parties agreed on adding nine POP:s. Among these the industrial chemicals perfluoroctasulfonate (PFOS) and commercial Penta- and Octabromodiphenyl-ether (BDE) are both listed in Annex XVII of REACH among the restricted chemical substances in textiles. Currently, 22 substances are listed. The main purpose of the agreement is to minimise the risk of their release into the environment. The Convention is administered by the United Nations Environment Programme[19].

At EU level, the relevant legal act for implementation of the Stockholm Convention is the POP Regulation (EC) No 850/2004[20]. This Regulation was written without prejudice to the future Reach Regulation, since it was regarded as important to implement these control measures on the listed substances as soon as possible.

4.2 Legislation indirectly linked to textiles

General Product Safety Directive (GPSD)
The General Product Safety Directive (2001/95/EC)[21] states that all consumer goods such as textiles that are placed on the market must be safe to use. The directive applies to all consumer goods and services sold by traders. The directive does not contain any specific chemical or other safety requirements, but generally requires that all goods and services must be safe and not entail any risk to human health. The consumers have to be guaranteed that their health is not endangered by the products placed on the market.

A warning system is linked to the Directive, which can be used for urgent action, i.e. RAPEX-system. RAPEX is an information system that all EU-countries can use to inform each other about products found on the market which imposes serious risks to human health, and indicating if products should be withdrawn from the market.

The Directive also provides for a temporary ban of a chemical that gives rise to risks that are not taken care of elsewhere. Such temporary bans have to be renewed every year until taken care of in sector specific legislation, i.e. in the case of chemicals for example Annex XVII to REACH. This option was for instance used in 2009, when the biocide dimethyl fumarate was restricted in consumer products (e.g. leather and footwear). Dimethyl fumarate was used as a

[18] http://www.Kemikalieinspektionen.se/sv/Start/Reach-forordningen/
[19] http://chm.pops.int
[20] EUT L 158, 30.4.2004, s. 7 (Celex 32004R0850).
[21] EUT L 11, 15.1.2002, s. 4 (Celex 32002D0095).

fungicide in imported goods and caused severe damage to several persons. (The restriction of dimethyl fumarate was transferred to REACH (EU) nr 412/2012)[22] in 2012.

As mentioned above, this Directive does not contain any rules concerning specific chemicals or products. Article 1.2. of the Directive states that in case other Union legislation on specific safety requirements applies to these chemicals or products, that legislation shall apply instead of the Directive.

Directive on Integrated Pollution Prevention and Control (IPPC)
The Directive 2008/1/EC concerning Integrated Pollution Prevention and Control (IPPC)" is addressing pollution from large industrial installations. The legislation is a minimum directive, which means that each Member State is allowed to impose stricter rules in their national legislation.

According to the Directive companies require a permit for industrial activities and agriculture with high pollution protection potential. Such permission may be granted only if certain environmental requirements are met. Companies must be responsible for the prevention and reduction of pollution they may cause. The companies referred to are those that are producers of energy, or engaged in metal processing, mineral processing, chemical industry, waste management, livestock and other industries, for example the textile industry.

<u>BAT (Best Available Technique)</u>
The basic obligation under the IPPC directive is that all appropriate preventive measures should be taken to avoid pollution, in particular by using the best available techniques (BAT). For a technology to be considered BAT it should be developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking costs and benefits into consideration.

The European Commission organises exchange of information between the Member States and the industries concerning BAT for the areas that are covered by it. The work leads to the "BAT Reference Documents," BREFs. Each document generally gives information on a specific industrial/agricultural sector in the EU, techniques and processes used in this sector, current emission and consumption levels, techniques to consider in the determination of BAT, and emerging techniques. The BREF documents are primarily made for the industries in which the IPPC Directive applies; a BREF for the textile industry was completed in 2003.

[22]http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:128:0001:0003:SV:PDF

The industrial emissions directive

The European Parliament and the Council agreed in 2010 that seven directives on industrial emissions would be incorporated into one, the industrial emissions directive (IED). The IPPC Directive is one of the directives that will be included in the IED. The new Directive 2010/75/EU[23] entered into force in January 2011. In 2014, the Directive shall also apply to existing plants. The IED involves tightening the application of BAT and reducing emissions from large combustion plants[24].

The Biocidal Products Regulation

Biocidal products are products used to protect people, animals or other properties against damage from pests or microorganisms. The new Biocidal Products Regulation (BPR), (EC) No 528/2012[25] will enter into operation the on 1 September 2013. This Regulation will then replace the current Biocidal Products Directive (BPD). The new regulation will apply directly in all EU countries and does not have to be implemented in national laws.

So far, textile products treated with biocides have not been regulated, since the BPD does now contain such requirements. In the new BPR products such as textiles, may only be treated with or incorporate biocides with active substances that have been authorised for that particular product type and for that particular use. This also includes textiles imported from outside the EU. An important part of the evaluation is that the biocide is effective (e.g. that it does not lose its efficacy by washing), and that it does not pose an unacceptable risk to the person using the treated product or to the environment. Products treated with or incorporating biocides must also be labelled information about the active substances they contain, so that consumers can make an informed choice (http://eur-lex.europa.eu).

Since there is a risk of over-lapping of different regulations, it is important to clarify that the proposals given in this report shall not affect the application of the Biocidal Products Regulation.

Conclusions so far:

In summary, there are few EU rules associated with textiles; they are contained in different regulations and it is difficult to get an overview. REACH mainly deals with chemical substances, and not products in particular. The Products Safety Directive is applicable with regard to health risks from chemicals in products, but the proposal for a revised General Product Safety Directive shows minor differences between the definitions of "products" or "articles". A clear definition of the term "textile product" would be a great advantage. Since the General Product Safety Directive contains a rule stating that where products are subject to specific safety requirements imposed by Union legislation, the Directive shall apply only to the aspects and risks or categories of risks not covered by those requirements. A specific regulation imposing restriction rules on hazardous chemicals in textile products would therefore be possible to apply in addition to the General Product Safety Directive, as well as preferable from the legislator's point of view.

[23] EUT L 334, 17.12.2010, s.17 (Celex 32010D0075).
[24] http://ec.europa.eu/environment/air/pollutants/stationary/ippc/index.htm
[25] EUT L 167, 27.6.2012, s. 1 (Celex 32012R0528).

4.3 Common voluntary initiatives

The aim of the textile eco-labels is to guide the consumers and the professional buyers in their choices by helping them to choose more environmentally friendly textiles. Consumers are also important when it comes to encouraging textile manufacturers to provide more environmentally friendly products. According to the eco-textile labelling guide from 2012 there are about 100 international standards and labels, but only 10 different kinds of textile labelling that put demands on the entire textile processing[26].

Eco-labels are classified in three groups: type I, type II and type III, according to the ISO standard (ISO, 2009). Type I is what we normally call an eco-label, type II is self- declared environmental claims and type III is environmental product declarations in which quantified environmental information is present.

Common to the labels is that they are controlled by an independent so-called "third party", in order to ensure that the producers qualify for the label. Generally, all labels have a time-limited validity and the companies must apply for the label periodically.

Another type of labelling is when the company itself chooses to call some garments Eco or Green garment, without having a third party certifying the criteria. In these cases the company sets up their own criteria. This is criticised by those who argue that it is not possible to examine one's own operations, without the need for an independent third party verification and control.

For the type I eco-labels, a certification is needed to be established for a product. The criteria for the certification take into account the environmental impact for the whole life-cycle for a product. The most common eco-labels in this group are: Bra miljöval (Good Environmental Choice), EU eco-label and the Nordic eco-label[27].

In addition to those presented below, there are also: smart textile standard, cradle to cradle, made in green, NSF and R certificate in the group of labelling that focus on the entire textile process (www.ecotextileslabel.com). The most common eco-labels are presented below.

Bra miljöval (***Good Environmental Choice)***
The Swedish eco-label (featuring peregrine falcon) from the Swedish Society for Nature Conservation (SSNC). This eco-label is presumed to be the toughest of all environmental labels, with stringent restrictions applying to raw materials and processing to the finished textile. The idea with the "Good Environmental Choice" is to use less harmful chemicals in the textile production. The "Good Environmental Choice" put demands on the chemicals degree of toxicity and persistence. The chemicals should not be harmful to the factory workers or to the consumers using the finished textile. The standards apply to textiles made of natural fibres and specific types of man-made fibres such as viscose and recycled fibres from polyester and polyamide. Reused textile products can apply for Bra miljöval Second hand or Re-design to reduce the use of new resources and environmental impacts[28].

[26] www.ecotextilelabels.com
[27] www.nordicecolabel.org
[28] www.naturskyddsforeningen.se

The Nordic eco-label

The Nordic eco-label, also called "the Swan", is a common eco-label for the Nordic countries. The Nordic Council of Ministers stands behind the label, but it is administered by each Nordic country. The Swan's environmental requirements concern the product life-cycle, from raw material all the way to waste. Products are verified through testing by independent laboratories, certificates and inspection. Clothing and textiles to be labelled with the swan cotton and other plant fibres, such as flax or wool, have to meet the EU requirements for organic production. The Swan rules also include synthetic materials and the use of recycled fibres. The label has strict requirements regarding the use of health-hazardous substances in the production and emissions to air and water from the factories. The finished fabric is tested for quality in terms of colour fastness and to withstand washing, abrasion and light and must not contain residues of toxic or hazardous chemicals[29].

EU Eco-label

The goal of the European Eco-label is to highlight products with reduced environmental impact during their entire life-cycles. The work is done on behalf of the European Commission and the requirements for the labelling are produced by the responsible bodies in EU member states. The requirements for clothing and textiles to be labelled with the EU eco-label are basically the same as for "the Swan". The label sets strict requirements for emissions to air and water from factories and use of health-hazardous substances in manufacturing. No environmental or hazardous residues of chemicals are allowed in the finished product. The fabric is also quality tested. The eco-label has a two-step labelling of textiles. The first step does not include the cultivation of plant fibres. In step two, at least 95 per cent of the cotton in the product is organic and there is a text on the labelling next to the flower with "organic cotton"[30] .

GOTS

Global Organic Textile Standard (GOTS) is an international label for clothing and textiles, and includes both ecological and social requirements. The purpose of the labelling is to help consumers select textile products, for which full responsibility for environmental and social responsibilities throughout the chain has been taken: cultivation, processing and manufacturing of finished garments. The requirements include strict rules on the use of chemicals in farming and preparation and the standard also imposes requirements on the working conditions. Harmful substances are not allowed in the finished textile and they must also meet specific performance in terms of quality. To be allowed to use the GOTS label the textile must contain at least 70 per cent of organic fibres. The rules also place demands on the employees´ working conditions and social rights. The label applies to any type of natural fibres products, yarns, fabrics and clothing and includes packaging. The standard also includes social criteria.

The four well-known organisations (IVN, Soil Association, OTA and the Japan Organic Cotton Association) do not exist as voluntary labelling anymore since they are included in the GOTS standard[31] .

[29] www.nordic-ecolabel.org
[30] www.ecolabel.eu
[31] www.global-standard.org

Bluesign®
This is an independent industry textile standard which is a tool for the entire textile production chain, from raw material and component suppliers who for example manufacture yarns, dyes and additives, to textile manufacturers, to retailer and brand companies and finally to consumers. Using "Best Available Technology" (BAT) along the entire textile manufacturing chain ensures that products meet the highest environmental standards. The standard works with lists of chemicals that may not be used in the process or chemicals for which specific limits must apply. Potentially harmful substances can thus be eliminated from being used at all. The environment, health, safety and working environments are taken into account. Only synthetic fibres are for the time being present in the standards. The cooperation includes many large companies within the field of outdoor products[32].

Oeko-Tex ®standard 100
Oeko-Tex® Standard 100 is a global health label for textile raw materials and finished products. The label guarantees that the finished product does not cause allergies or other health problems to the consumers. For a product to be labelled, it must have undergone an extensive testing to ensure that no hazardous chemicals are left in the fabric. The standard 100 certification ensures that textile products are tested to be free from harmful levels of more than 300 chemicals believed to be harmful to human health. The test must be performed by authorised, independent textile research and testing institutes. Oeko-Tex® 100 sets no requirements for organic production or employment. As a supplement there is Oeko-Tex ® 1000, which besides basic requirements do not allow any use of environmentally harmful aids and dyes in the production itself. Oeko-Tex® 1000 also includes requirements on energy efficiency throughout the chain and certain rules regarding working conditions. Requirements that fibres raw materials should be organic are not currently included in the Oeko-Tex ® 1000[33].

Joint Roadmap
Adidas, C&A, H&M, Li Ning, NIKE and PUMA are companies that in 2011 in cooperation wrote a very ambitious Joint Roadmap and made a commitment towards zero discharge of hazardous chemicals for all products in the supply chain by 2020. For transparency, the brands will report regularly and publicly on the progress against the published Joint Roadmap timeline (2020). In this context, hazardous chemicals are substances that show properties such as CMR, PBT, vPvB or endocrine disrupting properties. Last year, the platform for the continuing work was set and made the benchmark for the rest of the industry[34] .

Afirm
Afirm (Apparel and Footwear International RSL Management group) is an international forum for many companies in the textile and footwear industries. The collaboration has a view to reduce use and impact of hazardous chemicals in production. Also to provide a forum to advance the global management of restricted substances in apparel and footwear, communicate information about the restricted substance guide to the supply chain, discuss concerns, and exchange ideas for improving the management with the guidance[35] .

[32] www.bluesign.com
[33] www.oeko-tex.com
[34] www.roadmaptozero.com
[35] www.afirm-group.com

The American Apparel and Footwear Association (AAFA)
AAFA is a major textile industry association which facilitates the use of RSL for their members for restricted substances in finished textiles, apparel and footwear products. The RSL includes only those materials, chemicals and substances that are restricted or banned in the finished products mentioned above[36].

Company Restricted Substance Lists (RSLs)
As outlined above, there are a number of voluntary initiatives that companies can choose to consider when working with hazardous chemicals in textiles. The Swedish Chemical Agency has also compared Sweden-based companies' Restricted Substance Lists` to find out whether the restriction lists are similar or not. When comparing six Swedish companies´ RSLs (these company RSLs are not included in this report for confidentiality reasons,) by CAS-number, most of the chemical substances are not identical. One reason for this is that some of the companies restrict groups of substances, which means that the separate restricted substances will not appear on the list, since they are not specifically listed on a CAS-number level. Another reason is that the ambitions, when it comes to chemicals, vary among the companies, and that some companies therefore have stricter requirements. It is not uncommon that substances which are not relevant for the textile material, appear on textile RSLs. All together, this implies that the Swedish companies communicate chemical requirements to their sub-suppliers in very different ways.

Conclusion
To this date, there is no unique legislation at EU level covering impacts on the environment and human health from chemicals in textiles. A single EU regulation for textiles would make it easier for the European textile industry to set common standards for their suppliers. The voluntary labellings and restrictions lists used bythe industry today are not harmonised.

In the next chapter different regulation options to limit chemicals in textiles are discussed.

5 Regulatory options and impact assessment

5.1 Problem formulation

The production of textile is resource demanding by its use of chemicals, water and other resources. Human exposure to chemical substances in textile products may result in considerable negative health impacts that would imply high costs to both individuals and the society as a whole.

There are negative health impacts on workers (ranging from acute poisoning to long term health effects e.g. cancer) and on the environment (polluted groundwater, emissions to surface waters, toxic sludge etc.) caused by the use of chemicals in textile manufacturing.

From a consumer perspective the most apparent and direct health impact may be allergic reactions caused by skin contact with hazardous chemicals in textiles. Such effects are more common among workers in the textile and clothing sectors but they also occur among the general population. In addition to textile manufacturing, chemicals in textiles may also cause

[36] www.wewear.org

negative health and environmental impacts in the use phase. Hazardous substances may be released from textiles during washing, and depending on the effectiveness of end-of-pipe abatement (primarily in waste water treatment plants to which households are connected) these substances or their break-down products may end up in sludge and/or via effluent water into the water environment.

The consumer of textile products may suffer from negative health impacts caused by hazardous substances primarily via dermal exposure, indirect dermal and oral exposure via indoor dust, and indirect oral exposure through food. Children are particularly vulnerable and may, due to their proneness to put things in their mouths, be directly exposed to hazardous chemicals in textiles.

Other negative health impacts may occur in the longer term, e.g. due to exposure to substances with CMR properties. Such exposure to workers and consumers may result in considerable negative health impacts that would imply high costs to both individuals and the society as a whole.

The total consumption (and its trend) of textile products in the EU is difficult to measure in exact terms (Joint Research Centre 2012) but there is evidence (TemaNord 2012) of rapid growth over the past 10-15 years at least in Sweden. Imported textiles make up an increasing share of textile products consumed in the EU. As indicated by the *Preliminary analysis of textile/clothing sector* prepared within the COSMIC[37] project, currently most imported textiles originate from low cost production in the Asian countries and the trend is towards increased competition by such imports. The manufacturing of textiles within the EU is becoming increasingly specialised, e.g. in technical/industrial textiles and non-wovens. It has been indicated by stakeholders consulted by the Swedish Chemicals Agency that there is a higher degree of trust in textile products manufactured in the EU (with regards to potential hazardous chemicals contained in textiles), and this notion is also supported by findings described by Boström et al. 2011. The performance by EU textile manufacturers is likely influenced to a great extent by current EU regulations and voluntary initiatives described in section 4.2, and subsequently their products should cause less of a concern to humans and the environment. However, current regulations that are directly or indirectly linked to chemicals in textiles are unsatisfactory with regard to hazardous chemicals in textiles that are imported into the EU.

Any regulatory action to be considered should be effective at reducing the exposure from hazardous chemicals in textiles. It should be recognised that the textile supply chain is global and involves an uncountable number of actors ranging from merchandisers, importers, suppliers and sub-suppliers of textile products to producers of raw material etc. The textile market is characterised by high competition and market power by any individual actor is very limited, i.e. it is often difficult for individual EU textile importers to induce changes in manufacturing practices abroad without having to pay some extra costs. Similarly it would likely be difficult for any individual EU member state to achieve changes in the supply chain, for example by imposing national regulations on hazardous chemicals in textile products, since the textile market in a single country would be small compared with the global turnover in the textile supply chain. Therefore, in order for any regulatory action to be effective in reducing hazardous chemicals in textile products put on the market it is likely necessary to

[37] http://www.cosmic.sssup.it/index.php?option=com_content&view=article&id=57&Itemid=28

make it unified for a larger market, i.e. for the EU market for which there are regulatory alternatives to consider.

Any regulation aimed at reducing the exposure to hazardous chemicals in textiles should also be formulated in such a way that the actors in the textile sector as well as consumers are not affected negatively, for example compliance costs which could result in higher prices for consumers, compared with the positive impacts to human health and the environment.

5.2 Objectives

The assignment given to the Swedish Chemicals Agency, combined with the problems formulated in section 5.1, provide a basis to define objectives, i.e. the goals which are of primary focus while assessing the various regulatory options at hand. The main goals for the proposal will in summary be:

1. To present a unified regulation at EU level to effectively target hazardous chemicals in textiles placed on the market in the EU – regardless of production origin of the textile products.
2. To limit the content of hazardous chemicals in textile products intended for consumer use. As a starting point, the regulation should target substances classified as CMR (Category 1A and 1B), endocrine disrupting, environmentally hazardous, aquatic chronic 1, and substances classified as respiratory and skin sensitising.
3. To achieve a regulation that is practical, i.e. implementable, enforceable and manageable for the concerned parties.

All three main goals are weighed together in the discussion below. But the objectives also have to be examined in the light of different regulatory options. These are described one by one.

5.3 Identification of alternative regulatory options

In theory, there are numerous ways how to regulate chemicals in textiles intended for consumer use. A limited number of such options have been identified within the present assignment.

The principal regulatory option to consider (previously identified by the Swedish Chemicals Agency in KemI report 1/12 *Improved EU rules for A Non-Toxic Environment*) is to expand the Fibres Labelling Regulation to restrict the chemical content in textiles (see option A below). This option has been preliminary judged to potentially fulfill all three objectives as stated above. Moreover, it seems clear that this option is the one the European Commission points out as the main task for our working group to examine.

In addition to option A, several other regulatory options have been suggested to the Agency during previous and ongoing dialogue with stakeholders (primarily Swedish companies and organisations) but only a selected number of them are discussed further in this report. The most common suggestion made by the stakeholders is to regulate chemicals in textiles through the existing REACH Regulation. Mainly due to the preference indicated by the stakeholders consulted, and the potential for this option at least partly to fulfill the objectives, restricting the chemical content in textiles through the REACH Regulation has been identified

as a main alternative to option A. The option to create a new textile specific piece of legislation based on CE-labelling criteria that restrict chemical content in textiles (option C) has also been mentioned by some stakeholders as a possible way forward, and this regulatory option could provide a more thoroughly fitted legislation, particularly for chemicals in textile products. Finally, the option (D) to set up an environmental tax system for textiles is discussed briefly since this is currently under consideration by the Swedish Chemicals Agency as a potential regulatory action in Sweden.

As mentioned in chapter 1.4, there are currently several ongoing initiatives to improve the resource efficiency in the handling of textiles and textile waste. One measure that has been mentioned is the possibility to introduce an Extended Producer Responsibility (EPR). An EPR is a policy principle that promotes total life cycle environmental improvements of a product by extending the responsibilities of the manufacturer of the product to various parts of the product's life cycle. However, since the discussions about an EPR policy for textiles are at an early stage, and this type of policy is broader than the scope of the assignment given to the Swedish Chemicals Agency, the option of EPR per se has not been evaluated in this report. However, the regulation that is proposed in the report would most likely contribute to the achievement of some goals of a possible future EPR.

5.3.1 Option A: Expanding the Fibre Labelling Regulation to restrict the chemical content in textiles

With regard to labelling, the Fibre Labelling Regulation (EU) No. 1007/2011[38] states that textile products shall only be made available on the market provided that such products are labelled, marked or accompanied with commercial documents in compliance with the regulation (article 4). As summarised by the European Commission[39] the reasons for legislation on textile names are twofold:

- If the provisions of the Member States with regard to names, composition and labelling of textile products were to vary from one Member State to another, this would create hindrances to the proper functioning of the internal market.
- Consumer interests need to be protected by correct information.

The scope of the Regulation is that all products containing at least 80 per cent by weight of textile fibres, including raw, semi-worked, worked, semi-manufactured, semi-made, and made-up products are covered in the Regulation. These definitions are found in Article 2 and 3 of the Regulation. A list of exceptions from indication of textile fibre names or fibre composition on the lables and marking of textile products is provided in Annex V (e.g. disposable products, flags etc.).

The structure of the Regulation is divided in four chapters (general provisions, textile fibre names and related labelling and marking requirements, market surveillance and final provisions) and there are ten annexes that specify, for example, exceptions to mandatory labelling.

The Fibre Labelling Regulation stipulates certain issues to be reviewed by the European Commission (as required by Articles 24 and 25 in the Regulation). There are two studies

[38] EUT L 272, 18.10.2011, s. 1 (Celex 32011R1007).
[39] http://ec.europa.eu/enterprise/sectors/textiles/single-market/reg-1007-1011/index_en.htm

under consideration by the Commission: one regarding causal links between chemicals and allergic reactions and the other regarding what additional information could be on the label (e.g. labelling of origin, harmonised care labelling and uniform size labelling). These studies are made in order to prepare, where appropriate, legislative proposals in the context of existing EU legislation.

The Swedish Chemicals Agency identifies the above-mentioned review within the Fibre Labelling Regulation as an opportunity to regulate chemicals in textiles. The Regulation already provides a framework (e.g. general and final provisions, market surveillance, Annexes etc.) in which provisions on chemical content in textiles could be fitted to add protection of consumers and the environment. This regulatory option could thus be implemented through an expansion of the existing Regulation without having to create new legislation. The current scope of the Fibre Labelling Regulation could be kept intact in most aspects and the added requirements about chemical content in textiles would thus be relatively easy to communicate and be taken into practice among the concerned actors in the textile sector (since the requirements would be delivered in a regulatory context already known to them). The current scope of products in the Regulation would cover most textile products that are relevant to consider from a chemical hazard perspective, but it should be recognised that a (specifically designed) regulation that would explicitly target chemicals in textiles could benefit from a somewhat different product scope.

It should, however, be clarified that the Swedish Chemicals Agency´s idea is not to introduce new information requirements (as the term 'labelling' might indicate) about what kind of chemicals are contained in textile products. What the Agency instead identifies as the primary regulatory option is to introduce a union-wide regulation (within the Fibre Labelling Regulation) providing provisions on which hazardous substances that are not allowed in textile products placed on the market in the EU. As a general rule, the maximum concentration level should be set to the classification limit according to the CLP Regulation (EG) no 1272/2008[40]. In other words, this regulatory option would imply that no textile products shall be marketed if they do not comply with the regulation on chemical content in the textile.

In summary, the option to restrict chemical content in textiles through the Fibre Labelling Regulation has been judged on a preliminary basis to be an appropriate solution to fulfill all three objectives set out in section 5.2 because of the following reasons:

- The first objective would be satisfied since the current Regulation in fact already covers textile products (according to the set definition) placed on the market in the EU.
- The second objective could be met by fitting the corresponding requirements about hazardous chemicals into the Regulation.
- The third objective should also be achievable, but it will likely be essential to take into account the perspective of the concerned stakeholders in the legal technical formulation of the Regulation and accompanying guidance in order to avoid unnecessary cost impacts (in terms of e.g. administrative burdens, clarity of the regulation for information and communication in the supply chain, etc.). An accompanying guidance could amongst others include a non-exhaustive list of chemicals which are in the scope of the regulation, in order facilitate communication

[40] EUT L 353, 31.12.2008, s. 1 (Celex 32008R1272).

of the requirements in the supply chain. It would also be important to clarify the relation between any existing regulations (in particular restrictions within the REACH Regulation) and new requirements that would be defined within the Fibre Labelling Regulation. For example, if this alternative is developed, Annex XVII of the REACH Regulation has to be changed in a way that chemical substances in textile products will no longer be listed there. On the contrary, there are some kinds of products that are regulated in a special way, and it is not our intention to include such products in this alternative. Thus, the new rules are not intended to affect the regulations concerning biocidal products and toy safety (Directive 2009/48/EC on the safety of toys). As mentioned above, Chapter 4.2, Article 1.2 of the Directive on General Product Safety contains a *specific* rule which states that products which are subject to specific safety requirements imposed by Union legislation are covered by the regulations of the Directive and shall apply only when it comes to aspects and risks or categories of risks not covered by those requirements. A specific regulation imposing restriction rules for hazardous chemicals in textile products would therefore be possible to apply besides to the Directive on General Product Safety.

- Furthermore, a key argument for this regulatory option is that it could provide a relatively quick route towards better protection of human health and the environment since existing Union-wide legislation is already in place (the Fibre Labelling Regulation) that may be expanded to regulate chemicals in textile products.

The apparent advantages of this regulatory option makes it the principal option to assess further and with which to compare the other alternative regulatory options that are described below and that appear less able to fulfill the objectives of this assignment.

5.3.2 Option B: Restricting chemical content in textiles through the REACH Regulation

REACH is an EU wide chemicals regulation, (EU) No 1907/2006 that covers Registration, Evaluation, Authorisation and Restriction of Chemicals. Most of the provisions in REACH concern chemicals and manufacturers and importers (M/I) of chemicals (see section 4.1). Nevertheless, there are a number of provisions that indirectly or directly affect suppliers of products such as textiles. Here, it is relevant to discuss the provisions and to assess the possibilities (offered by regulatory option B) to fulfill the objectives set out in section 5.2.

Registration: If a supplier of a chemical chooses to discontinue the supply instead of registering the chemical, this will *indirectly* affect any producer of textiles and leather who at present uses the chemical for his production. However, the choice of discontinuation of the supply of certain chemicals is made by the supplier and the objectives set out in section 5.2 may not directly influence that choice.

Downstream user obligations: Producers of textile products who use chemicals in their production are, according to REACH, downstream users (DU). Although DUs have no registration obligations under REACH, they must communicate how they use the chemicals up the supply chain to the M/I of the chemicals. This is to allow the M/I to include the uses in their registration. The DUs then have to implement the exposure scenarios (including conditions for safe use) communicated to them via the Safety Data Sheet (SDS) from the suppliers of the chemicals. Another alternative is to make an own Chemical Safety Assessment and notify the use to ECHA. In summary, this obligation does not provide tools for regulatory authorities to impose any limits on the content of hazardous chemicals in textile

products. The DU obligations do however provide a basis for information exchange within the textile supply chain and it will thus facilitate the implementation of any regulation of chemical content in textile products.

Information on substances in articles: All suppliers of textile articles that contain more than 0.1% of a substance included in the REACH Candidate List need to comply with the REACH information provisions on substances in articles (Article 33.1, 33.2, and 7.2):

- Article 33.1 requires suppliers of articles always to provide recipients (professional customers) with sufficient information, available to the supplier, to allow safe use of the article including, as a minimum, the name at the substance concerned. Article 33.2 requires suppliers of articles to - on request only and free of charge - within 45 days provide consumers with sufficient information to allow the safe use of the article, including the name of the substance.
- Article 7.2 requires producers and importers of articles in certain cases also to make a notification to ECHA (if the total quantity of the substance in all articles, irrespective of category, supplied during a year is above 1 tonne). There are derogations to this requirement, for example that no notification is needed if the substance has already been registered for the use in question. The obligation applies from six months after that a substance has been listed in the Candidate List. The information to be provided includes the tonnage and the use of the substance in the article, for example if it is used as a flame retardant or a softener, and a description of the type of article and how it is used.

The information requirements briefly described above do not in any way prohibit hazardous chemicals to be contained in textile products placed on the market in the EU, and the objectives set out in section 5.2 can thus not be effectively achieved by adding the chemicals to the Candidate List. But as mentioned in section 4.1, the REACH Candidate List may be seen by many textile companies as a “prohibition list” on which actors in the textile sector take voluntary action to phase out certain chemicals from production.

Authorisation: As described in section 4.1, chemicals with particularly harmful intrinsic properties (SVHCs) may in some cases be subject to authorisation. However, the authorisation requirement is not applicable in the case of articles intended for consumer use that are imported to the Union and objective number 2 can therefore not be achieved (which disqualifies this option from further assessment).

Restriction: The main opportunities identified within REACH (in relation to the objectives) are that there are established procedures for limiting the use and marketing of chemical substances, including in articles. In addition to authorisation (which has already been discarded since it cannot be used to limit substances in imported articles), there are two different "procedures" how to impose restrictions:

- The normal restrictions procedure (art. 68.1): This is the most established procedure and includes that a thorough so-called Annex XV-dossier is made by a Member State or by ECHA on assignment by the European Commission. There is already a few restrictions in Annex XVII of REACH that limit the use of chemicals in textiles, such as the restrictions on Tris(aziridinyl)phosphinoxide (entry 7), PBB (entry 8), azodyes (entry 43), and DMF (entry 61). Normally, such a restriction covers both the use of a substance in articles and the marketing of articles containing the substance, to include also imported articles.

- The restriction procedure is simpler for CMRs in consumer chemicals and articles than for environmental hazardous substances (art. 68.2). This is a fast track compared with 68(1) since no restriction dossier is required and neither are ECHA's Committees involved in the procedure. The Commission, in collaboration with ECHA, is now working on a project related to this article. The main objective of the project is to gather experience on practical examples and suggest criteria for identifying substances for a restriction procedure following Article 68(2). They have prepared a list of 44 CMRs category 1A/1B that are potentially present in articles. From this list, a shorter list of substances will be defined for a more detailed analysis which will be presented later this year (www.kemi.se/reach).

Overall, it has been stated by several stakeholders consulted by the Swedish Chemicals Agency that the above-mentioned general requirements (related to registration, downstream users, information on substances in articles), in combination with the possibility to further regulate certain chemicals through the restriction routes, are sufficient to protect human health and the environment from hazardous chemicals in textile products. The REACH Regulation is said to be well known among the concerned actors in the textile supply chain, which is favourable from a practical point of view.

On the other hand, the REACH Regulation is not primarily intended (and therefore not purposely adapted) for regulation of chemical content in products, which are not chemical products, i.e. not in particular shaped to accommodate limits on hazardous chemicals in textile products. The experience so far is that the restriction procedure is very labour intensive and time consuming for the authorities, particularly in cases where consumer products are targeted. If the scope of hazardous chemicals in textile products set out in this assignment (see objective no. 2) is to be targeted by individual assessment within the REACH restriction procedure as it works today, it would likely take decades to hundreds of years to accomplish the objective. In addition, there is a risk that the resulting restrictions, made on a case by case basis with regard to proportionality of risk reduction measures, would imply a complex patch-work of restrictions with different implications for different types of textile products. Such regulations would become increasingly difficult for actors in the textile supply chain to practice and comply with.

In summary, the option to restrict chemical content in textiles through the REACH Regulation appears to be only to some extent able to fulfill the objectives set out in section 5.2:

- The first objective would be partially satisfied since the regulatory option would target textile products placed on the market in the EU but the regulation would eventually be made up by a large number of specifically targeted restrictions that would most likely not provide a unified regulation for all types of textile products.
- The second objective cannot be fulfilled due to the risk based approach applied in the REACH restriction procedure, i.e. in which the intrinsic properties of hazardous chemicals are not the determining factors. To achieve the objective by means of restrictions would require huge efforts by dossier submitters and there would be a long delay in the protection of human health and the environment.
- The third objective should be achieved in the individual REACH restrictions (since practicality is part of the guiding principles against which restriction proposals are assessed). However, the numerous individual restrictions that would be required to provide the level of protection to human health and the environment that are envisaged in objective number 2 would likely together constitute a non-practical sum of regulations that vary depending on the type of chemicals and textile products

concerned (in the non-exhaustive list of hazardous substances that may be contained in the final textile in Annex 3, 165 substances are currently listed)
- Finally, the apparent widespread support for acting within the REACH Regulation among the stakeholders consulted by the Swedish Chemicals Agency makes this regulatory option valid for further assessment – even if the Agency´s view is that this option would not fulfill some of the objectives.

This regulatory option does not correspond well to all objectives. But there are some advantages of this regulatory option, primarily the apparent support from industry stakeholders, which makes it appropriate for further assessment and comparison to regulatory option A.

5.3.3 Option C: Creating new textile specific legislation based on CE-labelling criteria that restrict chemical content in textiles

In order to simplify the process of technical harmonisation, the European Union has developed a specific method for legislation in the area of products. Early EU-product legislation contained detailed requirements, not only regarding the products but also regarding e.g. testing methods and public surveillance over placing on the market. This method turned out to be awkward and inefficient for developing the internal market. To facilitate the free movement of goods on the EU-market a new framework for technical harmonisation was developed, the so called "new approach". "New approach" is based on a few principles, such as[41]:

- there is a clear separation between the legislation and standardisation;
- legislative harmonisation is limited to the essential requirements (safety requirements of general interest) needed to ensure the free movement of products throughout the Community;
- the task of drawing up the corresponding technical specifications is entrusted to the standardisation bodies;
- products manufactured in conformity with harmonised standards are presumed to be conformant to the essential requirements;
- public authorities are still responsible for the protection requirements on their territory (e.g. market surveillance).

"New approach"- directives shall follow, with harmonised definitions, well-defined requirements for different actors in the supply chain regarding e.g. production control, traceability, documentation and CE-marking of products. The CE-marking shows that the legal requirements are fulfilled, including administrative requirements.

Today, there are a few sector-specific directives covering chemicals in goods following the new approach. Two examples of this are the Toy Safety Directive[42] and the Directive for Restriction of Hazardous Substances in electric and electronic equipment (RoHS)[43].

[41] http://ec.europa.eu/enterprise/policies/european-standards/harmonised-standards/new-approach_en.htm
[42] EUT L 170, 30.6.2009, s. 1 (Celex 32009D0048).

In the Toy Safety Directive there is a general requirement stating that toys shall not cause any danger to the user. The Directive contains three different restrictions/bans on chemicals. There are maximum migration limits for certain elements, maximum concentration limits for specified allergenic fragrances and a generic ban for content of CMR-substances. All these requirements are applicable for toys, parts of toys or microstructurally distinct parts of toys.

The directive on Restriction of Hazardous Substances (RoHS) bans the use of six substances, or groups of substances, i.e. lead, mercury, cadmium, hexavalent chromium (Cr VI), polybrominated diphenylethers (PBDE) and polybrominanted biphenyls (PBB), in electric and electronic equipment.

Regulating chemicals in textiles through a new-approach directive has some appealing features. It allows the legislation to be specific when it comes to which chemicals to restrict. When developing a new directive, the legislators can use the definitions and scope they find appropriate. It is a great advantage that the legislation will be specific for the aim of regulating chemicals in textiles. On the other hand, these advantages can all be applied to an expanded scope of the Fibres Labelling Regulation (regulatory option A), where the definitions are already written.

The administrative obligations that come with a new-approach directive must also be considered. Such obligations may cause administrative burdens for enterprises without leading to major advantages, e.g. regarding market surveillance or protection of health. The risk of imposing such administrative burdens has been pointed out by several of the actors in the textile sector consulted by the Swedish Chemicals Agency. For example, it is claimed by some stakeholders that textiles and apparel products (in all their variations) do not fit into the scope of the CE-marking system, and that extension of the marking system into textiles would cause confusion for market actors and consumers. For that reason it must be thoroughly examined if the impact of a new-approach regulation is justified compared to the aim of protecting health and the environment.

Another disadvantage is the aspect of time. Creating a new legal act will take more time, compared with regulatory option A which already provides a possible legal frame for regulating chemicals in textiles. In addition, if regulatory option C would be made as a directive, unlike a regulation, it would have to be transformed into national law in every separate Member State which would cause further delay in the protection of human health and the environment.

In summary, the option to restrict chemical content in textiles in a new piece of legislation based on CE-labelling appears to be partially able to fulfill the objectives set out in section 5.2:

- The first objective would be satisfied, and the regulation could be fitted specifically for chemical content in textile products.
- The second objective could be met by fitting the corresponding requirements about hazardous chemicals into the Regulation. However there would likely be a longer delay (compared to option A) before the regulation may come into effect, since it would have to be created as totally new legislation.

[43] EUT L 174, 1.7. 2011, s. 88 (Celex 32011D0065).

- The third objective should also be achievable, but it will likely be essential to take into account the perspective of the stakeholders concerned in the legal technical formulation of the regulation and accompanying guidance in order to avoid unnecessary cost impacts (in terms of e.g. administrative burdens, clarity of the regulation for information and communication, etc.). There are concerns expressed by stakeholders in the textile sector that this regulatory option, in particular with respect to the CE-labelling feature, would not be suitable for textile products which could imply excessive administrative burdens and lacking regulatory efficiency.

This regulatory option corresponds to the objectives in most aspects and it is therefore assessed further. But there are some disadvantages of this regulatory option, primarily the extensive work needed to propose completely new legislation (and subsequent time delay before the regulation may come into effect) and the apparent lack of support from industry stakeholders that make it less appealing than option A.

5.3.4 Option D: Environmental taxes on clothes and textiles

The Swedish Chemicals Agency has suggested (Kemikalieinspektionen Rapport Nr 1 2013) that economic policy instruments can be a valuable complement to regulations within the field of chemicals. The Agency is currently writing a proposal for a framework for taxation on consumer products which contain some specific chemical groups. The first step includes taxation on clothes and shoes. This option, environmental taxes, could be used not only for clothes, but for all types of textiles that are deemed relevant from a hazard and/or risk perspective. Such legislation could include a wide range of textile products, as fire fighters' clothing, furniture textiles and other textiles.

The main reasons for environmental taxes in the field of chemicals are to promote substitution to alternative products (or production methods) without harmful chemicals and to stimulate innovation of new products. The market will adjust in a cost effective way to the new price levels. There may be negative aspects as well, e.g. that the administration of environmental taxes could become a burden for companies as well as for authorities. It is therefore important to make any such taxation system clear and explicit in terms of which products that are covered and who is responsible for paying taxes. Further factors to consider would be, for example, if companies with small sale of the actual goods should be granted exemption from the taxation, how to ensure a solid control system and how to verify and test the goods by standardised tests and methods.

In summary, the option to limit chemical content in textiles by using environmental taxes on clothes and textiles appears unable to fulfill the objectives set out in section 5.2:

- Environmental taxes are at present only an option at national level since the EU has no taxation rights. Hence, this option cannot fulfill objective no. 1.
- The flexibility offered by an environmental tax system implies that objective no. 2 would likely not be achieved overall, i.e. the concerned market actors may choose to pay the tax instead of reducing the chemical content in textile products and the hazard posed to humans and the environment may thus remain in many cases. In other words, this regulatory option would likely be efficient in stimulating phase out and substitution of certain chemicals from textiles but it cannot impose strict limits (restriction) on hazardous chemicals in textiles.

This regulatory option is therefore disqualified from further assessment within this report (given the importance of the EU-wide objective stated in the government assignment). On the other hand it remains an option for Sweden to take the lead by acting alone on a national level in implementing an environmental tax on clothes (and textiles).

5.4 Identification of possible economic, social and environmental impacts

The conclusion from section 5.3 is that the regulatory option that fulfills all three of these objectives is Option A: expanding the Fibre Labelling Regulation to restrict chemical contents in textiles. Option C: creating new textile specific legislation based on CE-labelling criteria that restrict chemical contents in textiles, also corresponds to the objectives, but the Swedish Chemical Agency has identified other disadvantages with this option, for example the lack of support from industry stakeholders. The other options discussed above do not correspond to all of the objectives. For the regulatory proposal, the most appropriate alternative therefore seems to be option A. The identification of possible impacts is therefore primarily made with regard to regulatory option A and only refers to the other options as a comparison in specific issues.

The identification of possible impacts of the proposed regulatory option below should thus be seen as an extended discussion in relation to the objectives defined in section 5.2 and the brief assessment against the objectives made in section 5.3. The identification of possible economic, social and environmental impacts is made primarily with reference to the consultation with Swedish and European stakeholders performed by Agency during the assignment. In section 5.5, the proposed regulatory option (option A) is then assessed and compared with certain aspects that characterise the other regulatory options.

5.4.1 Health and environmental impacts

As mentioned in section 2.2 there are thousands of chemicals used in textiles today and many of them are not known to the textile manufacturer due to confidentiality reasons. Of the chemicals mapped in this report, 165 chemicals have a harmonised classification for toxicological endpoints covered in the report. The proposed regulatory option (option A) aims at reducing the hazard posed to human health and the environment by chemicals in textile products by limiting maximum concentration levels to the classification limit according to the CLP Regulation (EG) No 1272/2008. In practice, setting limit values for the targeted chemicals in textiles should be interpreted by the textile sector as a ban on the use of such chemicals. In most instances the easiest method to ensure that the limit values are not exceeded is to fully phase out the chemicals concerned from the production. The phase out of hazardous chemicals used and contained in textile products would thus likely induce positive effects for human health and for the environment in both the countries from which EU textile imports originate as well as in the EU. The positive impact to health and the environment in the textile manufacturing countries outside the EU will likely be substantial, especially in terms of improved health among textile sector workers, lower loads of hazardous emissions into surface and ground water in these countries and the subsequent reduction of health effects related to e.g. exposure through drinking water.

Several of the stakeholders consulted by the Swedish Chemicals Agency state that there are few risks associated with the exposure to chemicals in textiles, e.g. that there are very few cases of allergenic reactions reported via RAPEX or directly to the companies who supply

textiles to consumers. In addition, there are also comments by stakeholders arguing that the current legal framework is fully sufficient in addressing any risks that might be identified. However, it has been emphasised by Swedish industry representatives that there is a large number of companies (mostly SMEs) which are not aware of the hazards (and potential risks) that chemicals used in the textile production may pose to human health and the environment. With the introduction of the proposed EU regulation on textiles, these companies would have to start working on finding less hazardous chemicals.

In general terms, companies based in Sweden have indicated that it would be much easier to communicate and follow up chemical related requirements in a regulation than requirements in the form of voluntary measures (which are common today), since legal requirements are dealt with more seriously than voluntary measures. Legal requirements put more pressure on the chemical suppliers to produce safer chemicals and on sub-suppliers to use less hazardous chemicals in the production process. The proposal (option A) to regulate chemicals based on their intrinsic properties would thus be effective at reducing most potential risks from hazardous chemicals in textiles. The proposed regulation could be implemented relatively quickly and the potential gains to human health and the environment would subsequently be delivered relatively soon. Furthermore, such an approach would ensure that the substitution of the restricted substances will not result in the introduction of other substances with a harmonised classification of similar adversity. If the regulation is formulated to provide a possibility to approve specific uses, based on a risk assessment, it would still ensure protection of human health and the environment. Furthermore, this type of regulation would require the concerned actors in the textile sector (who should be better informed than the authorities e.g. about exposure to consumers) to provide information about any risks.

If regulatory option B would be chosen (as suggested by several stakeholders), i.e. that chemicals are to be restricted through a risk based approach, the protection of human health and the environment would likely be substantially delayed. The experience so far from applying REACH in the case of consumer products has shown it to be a very cumbersome process which would likely require large amount of resources by regulatory authorities to investigate and propose restrictions in all relevant textile cases. The potential negative health and environmental impacts caused by exposure e.g. to CMR substances would then continue until regulatory action is taken in each specific case. This approach could possibly also result in that textile manufacturers, in their substitution efforts, switch to other hazardous chemicals that would continue to cause negative impact on human health and the environment. In other words the regulatory actions would continue to lag behind the potential risk posed by chemicals in textile products.

5.4.2 Economic impacts

The proposed regulatory option would likely have economic impacts on the textile sector as well as on authorities responsible for enforcement activities. The textile supply chain is recognised as having a long and complicated value chain, involving actors within agriculture, chemical industry, textile and apparel industry, retail and service sector and waste management. In a recent report by the European Commission JRC (JRC 2012) the industry is characterised as fragmented and heterogeneous and dominated by small and medium enterprises (SMEs) which account for more than 80 per cent of the market. According to Eurostat structural data, there were more than 180 000 textile and clothing enterprises in the EU in 2009. However, there has been a clear downward trend in both the number of enterprises and their total turnover in the EU over the past 10-15 years.

Overall, the large number of actors potentially affected by any regulation on chemicals in textiles makes it difficult to make a detailed assessment of impacts, and the identification of possible economic impacts is only made in a general and qualitative manner based on input from a select number of actors in Sweden and the EU. Since all of the regulatory options target textile products that are placed on the market in the EU, the actors that would likely be most directly affected are producers, importers and retailers of textiles in the EU and the stakeholder consultation has therefore been targeted towards this group of actors (see Annex 2 for more information about the stakeholder consultation). For an in depth analysis of the textile and clothing sector worldwide and in Europe (covering aspects such as the structure of the supply chains, competitiveness, localisation of production and international trade) the *Preliminary analysis of textile/clothing sector* prepared within the COSMIC[44] project (CSR Oriented Supply-chain Management to Improve Competitiveness) may be a useful source to explore further.

Comments received during stakeholder consultation indicate certain impacts to be of main interest for further analysis, in particular:

- Substitution costs of adapting production and using alternative substances in textile manufacturing and finishing.
- Costs related to information and communication in the textile supply chain.
- Compliance control and enforcement activities.

These major types of impacts are further discussed below.

Substitution costs of adapting production and using alternative substances
The cost of substituting chemicals used in the production of textile products generally only constitutes a minor share of total production costs. According to some stakeholders there may even be cost savings as a result of increased awareness about chemicals and introduction of more sustainable production processes. The cost of substitution should therefore not be a major concern for most types of textile products, but the cost impacts will likely vary a lot for different actors in the textile supply chain.

If the chemicals targeted in this proposal (see Annex 3) would be limited in textile products, there might be efforts needed to find suitable alternative substances and to adapt formulations used in textile manufacturing. Judging from comments made by stakeholders consulted, the use of less hazardous alternative substances is already widespread because of e.g. voluntary use of companies' own Restricted Substances Lists, RSLs. Within the scope of the chemicals concerned, the proposed regulatory option would overlap in most parts with several existing voluntary RSLs and various environmental labelling schemes for textiles. Moreover, the proposed limit values (the maximum concentration level is the classification limit according to the CLP Regulation (EG) No 1272/2008) would in most instances be less strict than existing voluntary efforts. In addition, the proposed limit values are relatively forgiving in relation to e.g. detection limits (in the various test methods used for chemical analysis of textiles), cross contamination issues, residues from impurities in chemical formulations used in textile manufacturing etc. It thus appears, based on information received from stakeholders, that there should not be any significant costs related to *the use of* substitutes to hazardous chemicals that are proposed to be regulated.

[44] http://www.cosmic.sssup.it/index.php?option=com_content&view=article&id=57&Itemid=28

A less tangible kind of impact may be that the alternative chemicals that are used to substitute the ones that are restricted may have inferior properties e.g. in terms of effectiveness as detergent or colour fastness. Some positive properties in the final product of the chemicals used may thus be changed, for instance the properties of certain water protection treated outdoor clothes, which may reduce the quality and/or usability (benefit) to end consumers.

Information and communication in the textile supply chain

In order for any restriction on chemical content in textile products to become effective, it will be necessary to inform and communicate the requirements throughout all relevant parts of the supply chain where hazardous chemicals may be applied to the textile. Most of the consulted stakeholders emphasise the efforts put into communicating such requirements as major and the cost of those activities may be significant depending on how the requirements are formulated. Several of the consulted actors who deal with textile imports describe their supply chains as complex and it will thus be hard to reach out with correct information to all suppliers (and sub suppliers). It is often the case that EU textile importers are confined to business relations with the first tier of the textile supply chain (the supplier of the final textile product), and sub suppliers are usually not directly involved with the importer in terms of contractual agreements or direct information exchange. The textile importers are thus often dependent on the supplier (and sub suppliers) to pass on information along the supply chain.

The complex structure of the textile supply chain and the large number of actors involved makes it difficult for individual companies to effectively phase out hazardous chemicals from textiles. As described in section 4.3 there are currently a large number of voluntary initiatives (companies own RSLs, labelling schemes etc.) that impose restrictions on chemical content in textile products to be placed on the market. Many of the Swedish companies (ranging from industry organisations to individual companies engaged in retail and trade of textiles) consulted by the Swedish Chemicals Agency emphasise the need for a more coherent approach through which requirements on chemicals in textiles could be harmonised for a larger part of the market – preferably on at EU level. As it is today, there are a number of different voluntary initiatives by individual companies (or groups of companies) and it is difficult for suppliers and sub-suppliers to understand and accommodate the varying requirements posed by the buyers of textile products. It is therefore the Agency´s view that the proposed regulation, which would provide a common basis for requirements on chemical content in all textiles destined for the EU market, would facilitate the spreading of information as well as increase the understanding of the requirements among actors in the textile supply chain. Regulatory option B, on the other hand, could potentially develop (over time) into a complex set of restrictions for different types of textile products which would eventually imply even greater difficulties for the concerned actors in the textile supply chain to put into practice in an effective way (similarly to current voluntary efforts).

For the companies that already actively work with RSLs on a voluntary basis, the implementation of an EU wide regulation on chemicals in textiles could thus imply reduced costs and more efficient interaction with suppliers. The Swedish Chemical Agency´s interpretation is thus that most Swedish textile retailers and importers have a positive attitude towards harmonised regulation of some sort. There are, however, various opinions on how such regulation should be done and it is not evident from the Agency´s stakeholder consultation that the concerned actors prefer the proposed regulation (option A).

Many comments received during the stakeholder consultation suggest that regulation on chemicals in textiles should be stated explicitly in terms of which specific chemicals that are not allowed in the textile product. Some stakeholders argue strongly that the restricted

chemicals should be identified by CAS-number in order for them to be able to communicate to manufacturers and their sub-suppliers. Furthermore, it is argued that the chemicals that are to be restricted must be identified as relevant for textile products, i.e. there should not be any restriction on chemicals in textiles unless those chemicals have actually been shown to be used in textile manufacturing and that they are found in the final textile products. This manner of identifying restricted substances (compiled in so called RSLs) is already common as voluntary commitments among EU importers of textiles. Several of the stakeholders consulted argue that the best option would be to use a risk based approach to identify further substances that should be restricted, and that the current REACH framework provides sufficient regulatory tools to target any risks that are identified (this would speak in favour of regulatory option B).

The proposed regulatory option A on the other hand, implies that chemicals to be restricted are identified with reference to (harmonised) classification and labelling (as in the proposed regulatory option), i.e. the whole groups of substances are identified based on their classification with regard to hazard phrases related to the intrinsic properties of chemicals. This will likely imply a greater burden for actors in the textile supply chain to identify all chemicals that are targeted. Some stakeholders suggest that such a broad identification of chemicals (based on intrinsic properties) would imply that individual companies would have to create their own lists (of restricted substances) according to their own interpretation of the scope of the restriction, in order to communicate the restriction to their suppliers (since the necessary chemical expertise to make own interpretation will not be present among most actors on the supplier side). This could cause confusion and an extra work load for all concerned parts of the textile supply chain, and some of the benefits (in terms of facilitated communication towards textile supplier) from creating a unified requirement on chemicals in textiles in the EU could thus be lost.

It has been stressed by stakeholders that small and medium sized companies (SMEs) would have relatively great difficulties in dealing with any regulation that does not specifically identify (e.g. by CAS-number) which chemicals that are restricted, since it would require chemical expertise present in each company to make an interpretation of relevance and required measures with reference to e.g. substitution in their textile supply chain.

On the other hand it could also be argued that the current REACH Regulation is already imposing information requirements upon actors in the textile supply, e.g. about what information that must be made available concerning SVHC substances in articles, and the methods for collecting and spreading information on chemical content in textiles should therefore already be in place.

Overall however, it appears clear from comments made by the consulted stakeholders that the cost impacts related to information and communication could be considerable if there should be a restriction on chemicals in textiles that does not clearly identify which specific chemicals that are concerned. The proposed regulatory option does not provide such clarity within the legal context, but there are ways to provide clarity in this respect e.g. by successive development of guidance documents.

The Swedish Chemical Agency´s consultation with stakeholders also indicate that actors in the textile sector prefer not to have any new legislation – which would imply an administrative burden to understand and put it into practice – but to instead keep on working within existing legislation. The REACH regulation (option B) is stated to be well known and practicable for most actors in the textile sector and any risks related to hazardous chemicals

should thus be dealt with within that framework. It is interesting to note, however, that the attitude towards REACH appears to have changed somewhat over the past few years, indicated somewhat by comparing the comments received within this assignment with Agency's previous report 1/12 "Improved EU rules for A Non-Toxic Environment" as well as the findings reported by Boström et al. 2011. The Agency´s view is that the proposed regulatory option would indeed be a way to implement restrictions on chemical content in textile products within an existing regulation (the Fibre Labelling Regulation), and the regulatory framework could thus be made simpler and easier to understand for the concerned actors.

Chemical testing, compliance control and enforcement

The previous section describing potential cost impacts related to information and communication provides a basis for further discussion on compliance control and enforcement. Here, product tests and compliance control is referred to as the work done by companies themselves to ensure compliance with any regulation on chemicals in textiles, and enforcement means those activities performed by government authorities to control compliance with legislative requirements.

Several stakeholders consulted by the Swedish Chemicals Agency state that the possibilities to perform compliance control is largely dependent on the clarity of any regulation to be applied. It is said that chemicals that are to be restricted must be clearly identified as relevant to textile products, i.e. that the restricted chemicals are indeed used in production and contained in the final textile products that are made available to consumers, and that common testing methods and standards must be specified so that compliance may be verified throughout the textile supply chain. The reference to common standards for testing (to be used both by the companies themselves as well as by enforcement authorities) is claimed to be a prerequisite for a regulation to be practicable.

The extent (e.g. frequency of testing for various chemicals in textile products) of compliance control may be influenced by a range of factors that differ for individual companies depending on what type of textile products they deal with and how their supply chain is set up. In general it is often stated from an industry perspective that the costs of testing of textile products are the main additional cost of any regulation on chemicals in textiles (see e.g. Directorate General for Internal Policies, 2010). A recent interview based study, Boström et al. 2011 describes product tests, auditing and inspection as expensive, time-consuming, and difficult. The authors point out the importance of strategic test-plans and field trips to factories to assess incentives and capacities and to develop reflective trust. The latter points are also emphasised in a recent JRC Technical Report 2013 prepared within the Revision of the European Ecolabel and Green Public Procurement (GPP) Criteria for Textile Products. In their (draft) proposal, the JRC describes a model for risk-based testing in order to minimise the final product testing burden. This approach combines screening of products characteristics (e.g. specific colours, tones or finishes etc.), random testing, in-house testing of intermediate products by manufacturers or suppliers, equivalent testing carried out for other labels (other than the Eco-label), and mutual recognition of manufacturers RSLs and independent labels. The proposed regulation targets chemicals based on their intrinsic properties and not specifically on identifying chemicals that are actually used and found in textiles, which would possibly necessitate testing for a wider range of chemicals, even testing for chemicals that are very unlikely to ever be used in textile manufacturing.

The above-mentioned increased costs related to product testing will likely be less significant for those companies that are already engaged (proactively) in voluntary restrictions of

chemicals in textiles, i.e. for those who currently use their own RSLs or participate in e.g. (environmental) labelling schemes. However, judging from stakeholder comments received by the Swedish Chemicals Agency, even the 'proactive' companies will likely have to increase their efforts in testing and compliance control if chemicals in textiles are to be restricted by law (i.e. more strictly binding requirements).

Overall there are indications that the proposed regulation (option A) would imply greater frequency (and wider range of chemical analysis) in product testing that may amount to considerable costs to the textile sector. Such costs may be reduced if guidance is given with respect to e.g. methods for verification of compliance. The proposed regulatory option does not provide such clarity within the legal context, but there are ways to provide clarity in this respect e.g. by successive development of guidance documents.

5.5 Summary of the assessment of regulatory options

In section 5.3 four alternative regulatory options are assessed against the three primary objectives defined in this assignment, namely the objectives:

1. To present a unified regulation at EU level to effectively target hazardous chemicals in textiles placed on the market in the EU – regardless of production origin of the textile products.
2. To limit the content of hazardous chemicals in textile products intended for consumer use. As a starting point, the regulation should target substances classified as CMR (Category 1A and 1B), endocrine disrupting, environmentally hazardous, aquatic chronic 1, and substances classified as respiratory and skin sensitising.
3. To achieve a regulation that is practical; i.e. implementable, enforceable and manageable, for the affected parties.

The option that fulfills all three of these objectives is Option A: expanding the Fibre Labelling Regulation to restrict chemical contents in textiles. Option C: creating a new textile specific legislation based on CE-labelling criteria that restrict chemical contents in textiles, also corresponds to the objectives, but the Swedish Chemicals Agency has identified other disadvantages with this option, for example the lack of support from industry stakeholders. The other options discussed above do not correspond to all of the objectives, but option B is nevertheless discussed as a comparison to option A since the REACH Regulation appears to be the preferred regulatory option by many of the stakeholders consulted by the Agency.

The identification of potential impacts on human health and the environment as well as potential economic impacts are summarised in the table below:

Table 2: Summary of potential impacts of the regulatory options

Potential impacts	Regulatory option A (the proposed option): Expanding the Fibre Labelling Regulation to restrict chemical content in textiles	Other regulatory options
Human health and the environment		
- Scope of hazardous chemicals covered	(++) The proposed regulation would set limits for substances classified as CMR (Category 1A and 1B), endocrine disrupting, environmentally hazardous, aquatic chronic 1, and substances classified as respiratory and skin sensitising (Category 1). SVHC which are currently known to be used in the production of textiles and which can remain in the final textile are also included. The positive impacts on human health and the environment is expected to be substantial, but the effects cannot be quantified based on current scientific knowledge and available data. The scope of the regulation will be automatically expanded when additional substances are harmonised classified and labelled, thus providing a safeguard against (yet to be agreed) hazards to human health and the environment. Substitution to other substances with a harmonised classification of similar adversity would be prevented. The regulation could provide a framework for possible expansion to cover other hazardous substances in the future.	Option B: (--) The REACH restriction procedures would imply a risk based approach which would put the burden of proof on the authorities to prove unacceptable concern to human health and the environment for each individual chemical substance. Substitution to other substances with similar adversity would not be prevented. Option C: (++) Similar to option A.
- Strictness in terms of concentration limits	(+) The maximum concentration levels for the limited substances would be set to the classification limits according to the CLP Regulation (EG) No 1272/2008. In general the limit values are expected to be sufficiently strict to discourage the use of the targeted substances in the manufacturing of textile products. Stricter limit values would likely be appropriate for many of the targeted substances, and voluntary efforts (as indicated by existing RSLs) tend to set lower limit values than the proposed regulation. The regulation could provide a framework through which limit values may be lowered (through a risk based approach).	Option B: (++) The REACH restriction procedures may be more specifically targeted and limit values may be set to ensure safe exposure in each case. Option C: (+) Similar to option A.
- Timing	(++) The regulation could be implemented within a relatively short time frame since it is done within an existing regulation. The unified set of requirements for the whole EU market would facilitate information and communication in the textile supply chain and the reduction in chemical content in textile products would thus be accelerated.	Option B: (---) The protection of human health and the environment would be substantially delayed due to the case by case assessment of risks. Option C: (+) A new textile specific legislation could target the same chemicals as option

		A, but the regulation would likely take longer time to implement.
Economic impacts		
- Substitution costs of adapting production and using alternative substances	(+/-) The substitution costs do not appear to be a major concern in most types of textile products. The proposed limit values are relatively forgiving in relation to e.g. detection limits (in the various test methods used for chemical analysis of textiles), cross contamination issues and residues from impurities in chemical formulations used in textile manufacturing. The use of less hazardous alternative substances is already widespread because of e.g. voluntary use of companies' own RSLs. In terms of scope of chemicals concerned, the proposed regulatory option would overlap in most parts with several existing voluntary RSLs and various environmental labelling schemes for textiles. The substitution costs will thus likely be minimal for companies that are proactive today.	Option B: (++) The REACH restriction procedures includes identification of alternative substitutes and should ensure that substitution costs are not unproportional compared with the identified risks. Option C: (+/-) Similar to option A.
- Information and communication in the textile supply chain	(-) The complex structure of the textile sector and the large number of actors (of which many are SMEs) imply that any new regulations concerning textile products will require extensive efforts into information and communication in the textile supply chain. It is difficult, in particular for EU textile importers, to ensure smooth transition of new requirements to all suppliers and sub-suppliers. The proposed regulation would provide a common basis for requirements on chemical content in all textiles destined for the EU market, which would facilitate the spreading of information as well as increase the understanding of the requirements among actors in the textile supply chain. Thus there may be cost reductions at least for those companies that are proactive today (e.g. already using own RSLs). The scope of the regulation (which refers to harmonised classification and labelling) may imply difficulties for actors in the textile supply chain to interpret and identify which particular chemicals that are actually targeted. Many of the consulted stakeholders argue that chemicals should be named explicitly in terms of CAS-numbers in order for them to effectively communicate the requirements down the supply chain. SMEs may experience relatively more difficulties in this respect. The regulation would be implemented in the existing Fibre Labelling Regulation which, according to the Agency´s view, would provide a known and common regulatory entry point for the textile sector. This should facilitate information and communication in the supply chain. However, there is no widespread support of this view among the stakeholders consulted by the Agency.	Option A: (-) The REACH regulation is said to be known and communicable by the stakeholders consulted by the Swedish Chemicals Agency. However, there is a clear risk that this option would eventually imply a complex patch-work of restrictions with different implications for different types of textile products. Such regulations would become increasingly difficult for actors in the textile supply chain to practice and comply with. Option C: (--) It is stated by several stakeholders that a regulation based on CE-labelling criteria is not suitable for textile products. Such a regulation could cause confusion to market actors and consumers and eventually undermine the credibility of the CE-labelling scheme. Moreover, CE-labelling may imply considerable administrative burdens to actors in the textile supply chain.
- Chemical testing,	(---)	Option B: (-)

compliance control and enforcement	The cost of chemical testing and compliance control will to a large extent depend upon the effectiveness in information and communication within the textile supply chain. According to stakeholders consulted by the Swedish Chemicals Agency, there will be major difficulties (and resulting costs) if the regulation does not clearly state which chemicals that are targeted (in terms of CAS-numbers) and that reference to common standards for testing is a prerequisite for the regulation to be practicable. Chemical testing is often described in the literature as a major cost in the textile sector's efforts to impose requirements about chemical content in textiles. Such costs may be reduced by means of e.g. risk based testing.	REACH restrictions specifically target chemical substances and testing methods and possibilities for compliance control are normally assessed within the restriction procedure, and the related costs should therefore be less significant. Option C: (?) Not known or indicated in stakeholder consultation. May be similar to option A.

The assessment of the regulatory options, against the objectives defined in section 5.2 and in relation to potential impacts to human health and the environment as well as economic impact, provides support to conclude that regulatory option A is the most appropriate alternative.

When elaborating the regulatory option further, some of the above-mentioned potential economic impacts could probably be counteracted if the regulation is constructed with consideration to the particular circumstances that characterise the textile sector. In particular, it would then be necessary to make the legal technical framework and accompanying guidance as efficient as possible with regard to, for example:

- Clarity in which hazardous substances are actually relevant for textile production and which would subsequently need to be controlled/substituted.
- The chemical testing methods which are advised for verification and control (both by market actors themselves and the authorities).
- Possibilities to make derogations in cases that certain chemicals are deemed as essential to the manufacturing of textiles (provided they can be shown not to pose a concern to human health or the environment).
- Relation to the existing regulation, e.g. in how existing restrictions are referred to, in order to provide (if possible) the textile sector with one point of entry into understanding and complying with regulation of chemicals in textiles.

6 Conclusions

In the appropriation directions to the Swedish Chemicals Agency for 2013, the Agency was assigned by the Swedish government to further develop the idea of a coherent piece of EU legislation on hazardous chemicals in textiles. In summary, the present report to the government includes the following:

- A review of the hazardous chemicals that may be present in textiles.
- An evaluation of the risks that hazardous chemicals in various textiles may present (delimited to a qualitative assessment of exposure to humans and the environment).
- A negative list of chemicals that should be limited in textiles (presented in Annex 3 as a non-exhaustive list of chemicals).
- A simplified impact assessment of a selected number of regulatory options that have been assessed against the identified regulatory objectives defined in section 5.2.

The assignment has been made in dialogue with the textile industry and after consultation with the Swedish Environmental Protection Agency and the Swedish Consumer Agency.

The proposed regulation will provide a framework under which hazardous chemicals contained in textile products can be limited. This approach, which targets CMR category 1A/1B substances, substances classified as hazardous to the environment and certain classified allergens, is expected to result in substantial positive impacts in terms of decreased risks to human health and the environment. As a general rule, the maximum allowed concentration level in the final product is set to the classification limit for each substance (according to the CLP Regulation (EG) No 1272/2008). In addition, the regulation will provide a procedure by which concentration limits can be made more strict (compared to what is initially set by the aforementioned general rule), based on a case-by-case evaluation of chemicals contained in textile products. Similarly, for some substances which do not have a harmonised classification according to CLP, the maximum allowed concentration limit will also have to be evaluated on a case-by case basis. This is especially motivated with regard to EDCs and PBT/vPvBs which are found in textile products (and which are not covered by the basic scope of classified substances in the proposed regulation).

Furthermore, the proposed regulation should be constructed so that the potential negative economic impacts are minimised, for example by:

- Allowing derogations for continued use of some chemicals under certain circumstances, to be applied for by industry themselves.
- Clearly relating the new textile specific regulation to existing regulations on chemicals, thus creating coherent legislation that is manageable for the textile sector.
- Guidance (in addition to the legal obligations) on which chemicals (or groups of chemicals) that may be relevant to control/substitute in textile products, and which testing methods that are advised for verification of compliance.

7 Regulatory proposal

The Swedish Chemical Agency´s overall recommendation (based on the information presented above) is to regulate hazardous chemicals in textiles in the Regulation (EU) No 1007/2011 of the European Parliament and of the Council of 27 September 2011 on textile fibres names and related labelling and marking of the fibres composition of textile products. In practice this proposal implies that new articles are to be added to the Regulation, and this would be a further harmonisation within the already existing regulation on textile products.

According to the proposed regulation, hazardous chemicals with certain harmonised classification which can be found in finished textile products should be regulated at three different levels:

Level 1: Regulation without limited restrictions

- Substances contained in the final textile product with harmonised classification as Carcinogenic, Mutagenic and toxic to Reproduction (CMR), Category 1A/1B (Risk phrases H340, H350 and H360).
- Substances contained in the final textile product with harmonised classification as environmentally hazardous: Aquatic Chronic 1 (H410) , including the few substances of this kind on the present Candidate List in REACH that do not fall under the above mentioned classification criteria but which are currently known to be used in the production of textiles.

Level 2: Regulation with limited restrictions

- Substances contained in the final textile product with harmonised classification as respiratory and/or skin sensitising (H334 and H317). This restriction applies to textile clothing or products referred to in Article 2.2 (b) according to the Fibres Labelling Regulation.

There will be a possibility, under certain circumstances and on a case-by-case basis, to derogate substances regulated at level 1 and 2. Derogations are to be applied for by industry themselves.

Level 3: Procedure for including other substance or groups of substances and for lowering the maximum allowed concentration level

The Swedish Chemicals Agency also suggests including a procedure in the regulation to include other substances or groups of substances remaining in the final textile product on a case-by-case basis, in line with the procedure in the Toy Safety Directive (EG) No 2009/48 and its Annex C. Some examples of substances contained in the final textile product that should be considered for further restriction are:

- Substances which are defined as endocrine disrupting substances (EDC), when criteria for those substances have been set[45].

[45] The criteria do not refer to the classification criteria of CLP. They refer to the European Commission´s work with identifying criteria for EDCs, which can be found in the draft outline of the Commission.

- Substances of Very High Concern (SVHC) included in the REACH Candidate List according to article 57d (PBT), 57e (vPvB) and 57 f (substances of equivalent level of concern, eg. endocrine disruptors).
- Harmonised classified CMR Category 2 substances.
- Self-classified substances when necessary.

A similar procedure as above should also be applicable in case the maximum allowed concentration levels, according to the restriction of level 1 and 2 substances, need to be made stricter in order to protect human health and the environment from identified risks.

For the proposal of the regulatory text, please see Annex 1 in Chapter.

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9 Annexes

9.1 Annex 1 Regulatory proposal, Fibre Labelling Regulation

Regulatory proposal, Fibre Labelling Regulation

New Article 1.

1. Textile products shall not contain substances classified as carcinogenic, mutagenic or toxic to reproduction, Category 1, or hazardous to the environment, aquatic chronic 1, in
   accordance with 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.
2. Paragraph 1shall apply to chemical substances classified as respiratory and skin sensitising allergenic Category I in accordance with Regulation (EC) No 1272/2008 in
   - textile clothing, or
   - products referred to in Article 2.2. (b).
3. Without prejudice to the restrictions referred to in paragraphs 1 and 2, textile products shall not contain substances listed in *New Annex XI*.

New Article 2.

New Article 1 shall not apply to the substances listed in *New Annex XII*.

New Article 3

The measures referred to in New Article 1 shall not affect the application of Directive 2009/48/EC of the European Parliament and of the Council of 18 June 2012 on the safety of toys.

New Article 4

The measures referred to in New Article 1 shall not affect the application of Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products.

New Article 5

The Commission shall be empowered to adopt delegated acts in accordance with Article 22 concerning derogations from *New Article 1* by including substances in *New Annex XII*.

Article 1 shall be amended as follows.

This Regulation lays down rules concerning the use of textile fibre names and relating to labelling and marking of fibre composition of textile products, rules concerning the labelling or marking of textile products containing non-textile parts of animal origin, rules concerning the determination of the fibre composition of textile products by quantitative analysis of binary and ternary textile fibre mixtures *and restriction rules concerning hazardous chemicals in textile products*, with a view to improving the functioning of the internal market and to providing accurate information to consumers.

Article 3.1. shall be amended as follows.

(l) ‘Clothing’ means articles such as tops, underwear, nightwear, hosiery, buttons, jackets, dresses, suits and ensembles, gloves, sportswear, swimwear, scarves, shawls and ties.

(m) ‘Textile clothing’ means clothing consisting of at least 80 % by weight of textile fibres.

Article 4 shall be amended as follows.

Textile products shall only be made available on the market provided that such products are labelled, marked *and* accompanied with commercial documents *and not containing hazardous chemical substances* in compliance with this Regulation.

Article 18 shall be amended as follows.

Market surveillance authorities shall carry out checks on the conformity of the fibre composition of textile products with the supplied information related to the fibre composition of those products in accordance with this Regulation. *The checks shall include the existence, if any, of chemical substances covered by New Article 1 or listed in Annex XI A.*

*Article 21.1.*shall be amended as follows.

The Commission shall be empowered to adopt delegated acts in accordance with Article 22 concerning the adoption of technical criteria and procedural rules for the application of Article 20 (5), amendments to Annexes II, IV, V, VI, VII, VII and IX, in order to take account of technical progress, and amendments to Annex I in order to include, pursuant to Article 6, new textile fibre names in the list set out in that Annex.

The Commission may, for the purpose of adapting this Regulation to technical and scientific developments, adopt delegated acts in accordance with Article 22 in order to

- *amend Annex XI of the following substances or groups of substances:*

A. *Substances with harmonised classification as carcinogenic, mutagenic or toxic to reproduction, Category 2, in accordance with Regulation (EC) No 1272/2008.*

B. *Substances which are persistent, bioaccumulative and toxic in accordance with the criteria set out in Annex XIII of 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, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC.*

C. *Substances which are very persistent or very bioaccumulative in accordance with the criteria set out in Annex XIII of Regulation (EC) No 1907/2006.*

D. *Substances for which there is scientific evidence of probable serious effects to human health or the environment which give rise to an equivalent level of concern to those listed in points A – C above, and*

- *adopt specific limit values for substances or groups of substances covered by this Regulation and amend Annex XI accordingly.*

New Annex XI

A. Names of chemical substances.

No	CAS Number	Name of the chemical substance
1	56-35-9	Distannoxane, hexabutyl-
2	307-55-1	Tricosafluorododecanoic acid (PFDoA)
3	376-06-7	Heptacosafluorotetradecanoic acid (PFTA)
4	561-41-1	Benzenemethanol, .alpha.,.alpha.-bis[4-(dimethylamino)phenyl]-4-(methylamino)-
5	1163-19-5	Benzene, 1,1'-oxybis[2,3,4,5,6-pentabromo-
6	1314-41-6	Lead tetroxide
7	2058-94-8	Henicosafluoroundecanoic acid
8	2580-56-5	Methanaminium, N-[4-[[4-(dimethylamino)phenyl][4-(phenylamino)-1-naphthalenyl]methylene]-2,5-cyclohexadien-1-ylidene]-N-methyl-, chloride
9	6786-83-0	1-Naphthalenamine, 4-[bis[4-(dimethylamino)phenyl]methyl]-N-phenyl-
10	7738-94-5	Chromic acid (Chrome VI)
11	7789-12-0	Chromic acid (H2Cr2O7), disodium salt, dihydrate
12	8012-00-8	Pyrochlore, antimony lead yellow
13	10099-74-8	Lead dinitrate
14	12065-90-6	Pentalead tetraoxide sulphate
15	12141-20-7	Trilead dioxide phosphonate
16	12202-17-4	Tetralead trioxide sulphate
17	12578-12-0	Dioxobis(stearato)trilead
18	25637-99-4	Cyclododecane, hexabromo-
19	51404-69-4	Acetic acid, lead salt, basic
20	62229-08-7	Sulfurous acid, lead salt, dibasic
21	72629-94-8	Pentacosafluorotridecanoic acid (PFTrDA)
22	84777-06-0	1,2-Benzenedicarboxylic acid, dipentylester, branched and linear
23	91031-62-8	Fatty acids, C16-18, lead salts
24	776297-69-9	N-pentyl-isopentylphthalate

B. Limit values different from those in Regulation (EC) No 1272/2008.

New Annex XII

List of derogations, case by case.

Kommentarer till författningstexten

Ny Artikel 1 beskriver vilka farliga kemikalier vi föreslår ska begränsas i textilprodukter. Uppräkningen utgår från harmoniserad klassificering och de haltgränser som gäller i CLP-förordningen. När det gäller vissa allergena ämnen gör produkternas varierande användningsområden det svårt att föreslå ett totalt förbud. Vi avgränsar därför förbudet till att avse kläder och inredningstextilier. För de ämnen som inte täcks av harmoniserad klassificering görs en hänvisning till den *nya bilaga XI*.

Ny Artikel 2 hänvisar till undantagsmöjligheterna enligt den *nya bilaga XII*.

Ny Artikel 3 reglerar de nya bestämmelsernas förhållande till leksaksdirektivet. Utan en sådan skrivning kan gränsdragningsproblem vid tillämpningen hos marknadens aktörer väl som hos ansvariga myndigheter uppkomma.

Ny Artikel 4 reglerar de nya bestämmelsernas förhållande till den nya förordningen om biocidprodukter. Utan en sådan skrivning kan gränsdragningsproblem vid tillämpningen hos marknadens aktörer väl som hos ansvariga myndigheter uppkomma.

Artikel 1 ändras så att förordningens tillämpningsområde utvidgas med den nya begränsningsregeln. Härav krävs också följdändringar i *artiklarna 4 och 18.*

Artikel 3 utökas med definitioner av begreppen ”kläder” och ”textilkläder” då dessa förekommer i fråga om avgränsningen av allergena kemikalier.

Artikel 21 ändras så att förordningens kommittologiförfarande blir tillämpligt även på de nya reglerna. Avsikten har inte varit att frånhända kommissionen inflytande i just dessa delar, och skrivningen utgör därför en ren anpassning till redan befintliga regler. Ändringen kompletteras med *Ny Artikel 5*.

Ny bilaga XI listar de ämnen som inte ska få finnas i textilier och som inte omfattas av harmoniserad klassificering samt de ändrade gränshalter som kan komma i fråga.

Ny bilaga XII listar de undantag som blir aktuella.

9.2 Annex 2 Stakeholder consultation

Stakeholder meeting at the Swedish Chemicals Agency

In January 2013 the Swedish Chemicals Agency invited Swedish stakeholders to a meeting with the aim to discuss the scope of a future chemical regulation on textiles at EU level. A workshop was held where the same questions were discussed which later on also were sent out to Swedish and European based stakeholders in the questionnaire. Around 30 stakeholders participated in the meeting, represented by amongst others sector organisations, textile importers, textile companies, companies with experience from chemical analyses of chemicals in textiles, a representative from the Swedish Environmental Agency, a representative from the Swedish Consumer Agency and a representative from the Swedish government.

Information gathered from the meeting and the workshop has been taken into account in chapters 2-5 of the current report.

Questionnaire sent out to Swedish and European stakeholders

A questionnaire was sent out to about 45 stakeholders within the EU and 40 stakeholders within Sweden. The stakeholders represented the apparel industry through national and European organisations as well as through the companies themselves. The chemical industry was represented through TEGEWA and ETAD and NGOs were represented by the Swedish Society for Nature Conservation. Also the organisation in Sweden working with textile labelling (The Nordic eco-label "the swan") as well as the Swedish Society for Nature Conservation (Bra Miljöval) were consulted. Expert groups were represented by Swerea IVF and Textil-och Läderlaboratoriet.

In short, the questionnaire below asked for information on which policy option would be the most appropriate for regulating chemicals in textiles and which procedure would be the best to include chemicals in such a regulation.

Information gathered from the questionnaire sent out has been taken into account in chapters 2-5 of the current report.

The following stakeholders answered the questionnaire:

1. AB Lindex
2. CIRFS European Man-made Fibres Association
3. EPA - The Danish Environmental Protection Agency's
4. ETAD - The Ecological and Toxicological Association of Dyes and Organic Pigment manufacturers
5. Euratex – The European Apparel and Textile Confederation
6. FESI - Federation of the European Sporting goods Industry
7. Germany-Association of the Textile and Clothing Industry in Northwestern Germany
8. Haglöfs

9. Hemtex AB
10. H&M Hennes & Mauritz GBC AB
11. Houdini Sportswear
12. Ikea of Sweden
13. TEGEWA (Association of producers of textile, paper, leather and fur auxiliaries and colourants, surfactants, complexing agents, antimicrobial agents, polymeric flocculants, cosmetic raw materials, pharmaceutical excipients and allied products)
14. KappAhl
15. Ministry of employment and the Economy of Finland
16. Nordic Initiative Clean & Ethical (NICE)
17. Norsk Industri / Federation of Norwegian Industries
18. Svanen Miljömärkningen Sverige AB
19. Swedish Society for Nature Conservation
20. Swerea IVF
21. Stockholm University, Department of Applied Environmental Science ITM
22. Stockholm Vatten AB
23. Textil-och Läderlaboratoriet, Sverige

External reference group within Sweden

The draft report was sent to 22 external companies/organisations within Sweden for commenting and 11 responses were received.

Study trip to Ikea of Sweden

In February 2013 two members of the project group went on a study trip to Ikea of Sweden in Älmhult. The purpose was to understand how Ikea works with chemicals in textiles, but also to receive feedback on the questionnaire sent out and to understand how a chemical regulation on textiles can influence the textile industry.

KEMI
Kemikalieinspektionen
Swedish Chemicals Agency

2013-02-14

Questionnaire concerning EU-wide restriction on hazardous chemicals in textiles

The Swedish Chemicals agency (KemI) has been commissioned by the Swedish government to further develop the idea of a coherent EU legislation on hazardous chemicals in textiles. The report to the government shall include the following:

- A review of the hazardous chemicals that may be present in textiles
- An evaluation of the risks that hazardous chemicals in various textiles present
- A negative list of chemicals that should be limited in textiles
- A legislative proposal for a regulation at the EU-level
- The proposal for legislation should be accompanied by an impact assessment, in those parts that are possible to analyze within the frame of the commission

The Swedish Chemical Agency was given the assignment in of the 22nd of December, 2012 and shall report the results to the government (Ministry of Environment) not later than the 12th of April 2013. This makes the time schedule very short.

The assignment should be made in dialog with textile industry/companies and in consultation with the Swedish Environmental Protection Agency and the Swedish Consumer Agency. To be able to fulfill these government demands and to understand the views of different stakeholders, **The Swedish Chemical Agency is asking for feed-back on certain questions**. In particular we are investigating issues related to what kind of regulation at the EU level that could be the most appropriate for hazardous chemicals in textiles and what kind of impacts (positive as well as negative) that could result from different policy options.

We would very much appreciate if you have the opportunity to answer the questions below. **Please provide your response to Anna Nylander, Anna.Nylander@kemi.se, +46 (0)8 519 41 205, no later than 28 February 2013**.

In order for us to validate the responses given to the questionnaire, we kindly ask you to provide:

The name of your organisation:

Your name and title:

Questions:

1. **In our investigation so far, we have found two main alternative approaches on how to target hazardous chemicals in textiles that are in need of regulation (please comment both alternative approaches e.g. in terms of practicality and manageability);**

1. Based on the intrinsic properties of chemicals, i.e. based on available classification of chemicals. Our preliminary framing would then imply that chemicals which are classified as being carcinogenic, mutagenic, toxic for reproduction, allergenic or environmentally hazardous are to be restricted above certain limit values (limit values yet to be defined). This approach is similar to the one used in the Toy safety directive (TSD).

   Your response (please motivates and describe pros and cons):

2. Based on a list of chemicals that are to be restricted above certain limit values. The same classifications as above could be used to identify chemicals to put on the list, i.e. the scope would be the same as in the above approach. This listing approach would be more similar to the Restricted Substances Lists (RSL) used by many companies today. However the list would be in the magnitude of hundreds or even thousands of substances to cover the mentioned classifications. In addition the list would need to be updated regularly e.g. when additional classifications of chemicals are made.

   Your response (please motivate and describe pros and cons):

3. **Is the proposed framing of hazardous chemicals (carcinogenic, mutagenic, toxic for reproduction, allergenic and environmentally hazardous) appropriate to consider for regulation (or other policy actions) of chemicals in textiles at EU level?**

   Your response (please motivate and describe pros and cons with a regulation or other policy action):

4. **Assuming that the hazardous chemicals in textiles identified above are to be targeted by a regulation (or other policy actions), how would you prefer to have any regulation (or other policy actions) implemented for chemicals in textiles? (Please comment all options if possible)**

1. **In the REACH Regulation (2006/1907/EC).** In this regulation there are currently a number of restriction rules in Annex XVII, that are regulating chemicals in for example textiles.

   Your response (please motivate and describe pros and cons):

2. **In the Eco design directive (2009/125/EC).** Today this directive is aimed at improving energy efficiency and to reduce the environmental impact from energy related

products in a life cycle perspective. During the review of the directive in 2014 other product groups might be taken into account into this directive, and textiles could be then be considered.

Your response (please motivate and describe pros and cons):

3. **In the fibres labelling regulation (2011/1007/EC).** Today this regulation requires that textiles are labelled to indicate the content of textile fibres. The regulation provides a clear definition of what is and what is not a textile. This regulation could possibly be expanded to other textile related issues, for example hazardous chemicals. By September 2013 the Commission shall present a report which will address issues of allergic reactions due to chemicals in textiles and labelling concerning allergens.

   Your response (please motivate and describe pros and cons):

4. **In a new legislation that would define CE-labelling criteria, similar to the RoHS directive (2011/65/EC) and the Toy safety directive (2009/48/EC)**. The two directives are similar in many ways, that is way they are presented here as one example. The RoHS directive regulate certain harmful substances in electric and electronic equipment and the Toy directive regulate; carcinogenic, mutagenic and substances that are toxic to reproduction above a specific concentration limit and also banns certain fragrances in the products. The CE-mark shall be put on products when compliance with the requirements in the directive is assured. It is the manufacturers responsibility to CE-make the product.

   Your response (please motivate and describe pros and cons):

5. **Other policy actions** (e.g. economic instruments or voluntary agreements)?

   Your suggestions (please specify and motivate):

6. **Other comments or suggestions (please feel free to comment on other issues regarding textiles and regulation)**

9.3 Annex 3 Non-exhaustive list of chemicals that may be found in the final textile product

No	Name of the chemical substance	CAS Number	Included in the REACH Candidate List	Respiratory sensitisation 1/1A/1B	Skin sensitisation 1/1A/1B	Carcinogenic category 1A/1B	Mutagenic category 1A/1B	Toxic to reproduction category 1A/1B	Environmentally hazardous, long-term effects Aquatic Chronic 1
1	Formaldehyde	50-00-0	No	No	Yes	No	No	No	No
2	Distannoxane, hexabutyl-	56-35-9	Yes	No	No	No	No	No	No
3	Phenol, 2,3,4,6-tetrachloro-	58-90-2	No	No	No	No	No	No	Yes
4	Benzenamine, 4-(phenylazo)-	60-09-3	Yes	No	No	Yes	No	No	Yes
5	Benzenamine	62-53-3	No	No	Yes	No	No	No	No
6	Formamide, N,N-dimethyl-	68-12-2	Yes	No	No	No	No	Yes	No
7	Formamide	75-12-7	No	No	No	No	No	Yes	No
8	1(3H)-Isobenzofuranone, 3,3-bis(4-hydroxyphenyl)-	77-09-8	No	No	No	Yes	No	No	No
9	Acetamide, 2-chloro-	79-07-2	No	No	Yes	No	No	No	No
10	Phenol, 4,4'-(1-methylethylidene)bis-	80-05-7	No	No	Yes	No	No	No	No
11	Benzene, 1-(1,1-dimethylethyl)-3,5-dimethyl-2,4,6-trinitro-	81-15-2	No	No	No	No	No	No	Yes
12	1,2-Benzenedicarboxylic acid, bis(2-methylpropyl) ester	84-69-5	Yes	No	No	No	No	Yes	No
13	1,2-Benzenedicarboxylic acid, dibutyl ester	84-74-2	Yes	No	No	No	No	Yes	No
14	1,3-Isobenzofurandione	85-44-9	No	Yes	Yes	No	No	No	No
15	1,2-Benzenedicarbo1ylic acid, butyl phenylmethyl ester	85-68-7	Yes	No	No	No	No	Yes	Yes
16	2-Metoxy bensene amine	90-04-0	No	No	No	Yes	No	No	No
17	Methanone, bis[4-(dimethylamino)phenyl]-	90-94-8	Yes	No	No	Yes	No	No	No
18	Naphthalene	91-20-3	No	No	No	No	No	No	Yes
19	2-Naphthalenamine	91-59-8	No	No	No	Yes	No	No	No

20	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dichloro-	91-94-1	No	No	Yes	Yes	No	No	Yes
21	1,1'-Biphenyl	92-52-4	No	No	No	No	No	No	Yes
22	[1,1'-Biphenyl]-4-amine	92-67-1	Yes	No	No	Yes	No	No	No
23	[1,1'-Biphenyl]-4,4'-diamine	92-87-5	No	No	No	Yes	No	No	Yes
24	Benzene, 1,2-dichloro-	95-50-1	No	No	No	No	No	No	Yes
25	Benzenamine, 2-methyl-	95-53-4	Yes	No	No	Yes	No	No	No
26	Benzenamine, 4-chloro-2-methyl-	95-69-2	No	No	No	Yes	No	No	Yes
27	1,3-Benzenediamine, 4-methyl-	95-80-7	Yes	No	Yes	Yes	No	No	No
28	Propane, 1,2-dibromo-3-chloro-	96-12-8	No	No	No	Yes	Yes	Yes	No
29	Propane, 1,2,3-trichloro-	96-18-4	No	No	No	Yes	No	Yes	No
30	Benzenamine, 2-methyl-4-[(2-methylphenyl)azo]-	97-56-3	Yes	No	Yes	Yes	No	No	No
31	Thioperoxydicarbonic diamide, tetraethyl-	97-77-8	No	No	Yes	No	No	No	Yes
32	Benzene, (trichloromethyl)-	98-07-7	No	No	No	Yes	No	No	No
33	Benzenamine, 4,4'-methylenebis[2-chloro-	101-14-4	Yes	No	No	Yes	No	No	Yes
34	Benzenamine, 4,4'-methylenebis[N,N-dimethyl-	101-61-1	Yes	No	No	Yes	No	No	Yes
35	Benzenamine, 4,4'-methylenebis-	101-77-9	No	No	Yes	Yes	No	No	No
36	Benzenamine, 4,4'-oxybis-	101-80-4	Yes	No	No	Yes	Yes	No	No
37	Benzene, 1,4-dichloro-	106-46-7	No	No	No	No	No	No	Yes
38	Benzenamine, 4-chloro-	106-47-8	No	No	Yes	Yes	No	No	Yes
39	1,4-Benzenediamine	106-50-3	No	No	Yes	No	No	No	Yes
40	Ethane, 1,2-dibromo-	106-93-4	No	No	No	Yes	No	No	No
41	Ethane, 1,2-dichloro-	107-06-2	No	No	No	Yes	No	No	No
42	2-Propenenitrile	107-13-1	No	No	Yes	Yes	No	No	No
43	Ethanedial	107-22-2	No	No	Yes	No	No	No	No
44	1-Octadecanaminium, N,N-dimethyl-N-octadecyl-, chloride	107-64-2	No	No	No	No	No	No	Yes

45	Ethanol, 2-methoxy-	109-86-4	No	No	No	No	No	Yes	No
46	Ethane, 1,2-dimethoxy-	110-71-4	No	No	No	No	No	Yes	No
47	Ethanol, 2-ethoxy-	110-80-5	No	No	No	No	No	Yes	No
48	Cyclohexane	110-82-7	No	No	No	No	No	No	Yes
49	Ethane, 1,1'-o1ybis[2-methoxy-	111-96-6	No	No	No	No	No	Yes	No
50	2,5,8,11-Tetrao1adodecane	112-49-2	No	No	No	No	No	Yes	No
51	Ethanol, 2-chloro-, phosphate (3:1)	115-96-8	Yes	No	No	No	No	Yes	No
52	1,2-Benzenedicarbo1ylic acid, bis(2-ethylhexyl) ester	117-81-7	Yes	No	No	No	No	Yes	No
53	1,2-Benzenedicarboxylic acid, bis(2-methoxyethyl) ester	117-82-8	Yes	No	No	No	No	Yes	No
54	Benzene, hexachloro-	118-74-1	No	No	No	Yes	No	No	Yes
55	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethoxy-	119-90-4	No	No	No	Yes	No	No	No
56	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-	119-93-7	No	No	No	Yes	No	No	No
57	Benzenamine, 2-methoxy-5-methyl-	120-71-8	Yes	No	No	Yes	No	No	No
58	Benzene, 1,2,4-trichloro-	120-82-1	No	No	No	No	No	No	Yes
59	Benzene, 1-methyl-2,4-dinitro-	121-14-2	No	No	No	Yes	No	No	Yes
60	Acetamide, N,N-dimethyl-	127-19-5	Yes	No	No	No	No	Yes	No
61	Phenol, pentachloro-, sodium salt	131-52-2	No	No	No	No	No	No	Yes
62	Benzenamine, 2,4,5-trimethyl-	137-17-7	No	No	No	Yes	No	No	No
63	Benzenamine, 4,4'-thiobis-	139-65-1	No	No	No	Yes	No	No	No
64	Phenol, 4-(1,1,3,3-tetramethylbutyl)-	140-66-9	No	No	No	No	No	No	Yes
65	2-Propenoic acid, ethyl ester	140-88-5	No	No	Yes	No	No	No	No
66	Phenol, 4-methoxy-	150-76-5	No	No	Yes	No	No	No	No
67	Hydrazine	302-01-2	Yes	No	Yes	Yes	No	No	Yes
68	Tricosafluorododecanoic acid (PFDoA)	307-55-1	Yes	No	No	No	No	No	No
69	Acetic acid, nickel(2+) salt	373-02-4	No	Yes	Yes	Yes	No	Yes	Yes

70	Heptacosafluorotetradecanoic acid (PFTA)	376-06-7	Yes	No	No	No	No	No	No
71	2H-1,3,5-Thiadiazine-2-thione, tetrahydro-3,5-dimethyl-	533-74-4	No	No	No	No	No	No	Yes
72	Methanaminium, N-[4-[bis[4-(dimethylamino)phenyl]methylene]-2,5-cyclohexadien-1-ylidene]-N-methyl-, chloride	548-62-9	Yes	No	No	Yes	No	No	Yes
73	Benzenemethanol, .alpha.,.alpha.-bis[4-(dimethylamino)phenyl]-4-(methylamino)-	561-41-1	Yes	No	No	No	No	No	No
74	Benzenamine, 4-[(4-aminophenyl)(4-imino-2,5-cyclohexadien-1-ylidene)methyl]-, monohydrochloride	569-61-9	No	No	No	Yes	No	No	No
75	Methanaminium, N-[4-[[4-(dimethylamino)phenyl]phenylmethylene]-2,5-cyclohexadien-1-ylidene]-N-methyl-, chloride	569-64-2	No	No	No	No	No	No	Yes
76	1-Naphthalenesulfonic acid, 3,3'-[[1,1'-biphenyl]-4,4'-diylbis(azo)]bis[4-amino-, disodium salt	573-58-0	No	No	No	Yes	No	No	No
77	Benzene, 2,4-diisocyanato-1-methyl-	584-84-9	No	Yes	Yes	No	No	No	No
78	Diisopentylphthalate (DIPP)	605-50-5	Yes	No	No	No	No	Yes	No
79	Benzene, pentachloro-	608-93-5	No	No	No	No	No	No	Yes
80	1,3-Benzenediamine, 4-methoxy-	615-05-4	No	No	No	Yes	No	No	No
81	1,4-Benzenediamine, dihydrochloride	624-18-0	No	No	Yes	No	No	No	Yes
82	Dibutyltin dichloride (DBTC)	683-18-1	Yes	No	No	No	No	Yes	Yes
83	Hexane, 1,6-diisocyanato-	822-06-0	No	Yes	Yes	No	No	No	No
84	Benzenamine, 4,4'-methylenebis[2-methyl-	838-88-0	Yes	No	Yes	Yes	No	No	Yes
85	2-Naphthalenol, 1-(phenylazo)-	842-07-9	No	No	Yes	No	No	No	No
86	2-Pyrrolidinone, 1-methyl-	872-50-4	Yes	No	No	No	No	Yes	No

87	Benzene, 1,1'-oxybis[2,3,4,5,6-pentabromo-	1163-19-5	Yes	No	No	No	No	No	No
88	Arsenic oxide	1303-28-2	No	No	No	Yes	No	No	Yes
89	Boron oxide	1303-86-2	No	No	No	No	No	Yes	No
90	Lead tetroxide	1314-41-6	Yes	No	No	No	No	No	No
91	Lead sulfochromate yellow	1344-37-2	Yes	No	No	Yes	No	Yes	Yes
92	1-Octanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-	1763-23-1	No	No	No	No	No	Yes	No
93	2,7-Naphthalenedisulfonic acid, 4-amino-3-[[4'-[(2,4-diaminophenyl)azo][1,1'-biphenyl]-4-yl]azo]-5-hydroxy-6-(phenylazo)-, disodium salt	1937-37-7	No	No	No	Yes	No	No	No
94	Henicosafluoroundecanoic acid	2058-94-8	Yes	No	No	No	No	No	No
95	Methanaminium, N-[4-[[4-(dimethylamino)phenyl]phenylmethylene]-2,5-cyclohexadien-1-ylidene]-N-methyl-, ethanedioate, ethanedioate (2:2:1)	2437-29-8	No	No	No	No	No	No	Yes
96	1,3,5-Triazine-2,4,6(1H,3H,5H)-trione, 1,3,5-tris(oxiranylmethyl)-	2451-62-9	No	No	Yes	No	Yes	No	No
97	9,10-Anthracenedione, 1,4,5,8-tetraamino-	2475-45-8	No	No	Yes	Yes	No	No	No
98	Methanaminium, N-[4-[[4-(dimethylamino)phenyl][4-(phenylamino)-1-naphthalenyl]methylene]-2,5-cyclohexadien-1-ylidene]-N-methyl-, chloride	2580-56-5	Yes	No	No	No	No	No	No
99	2,7-Naphthalenedisulfonic acid, 3,3'-[[1,1'-biphenyl]-4,4'-diylbis(azo)]bis[5-amino-4-hydro1y-, tetrasodium salt	2602-46-2	No	No	No	Yes	No	No	No

100	1-Octanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, potassium salt	2795-39-3	No	No	No	No	No	Yes	No
101	Acetamide, N-[4-[(2-hydroxy-5-methylphenyl)azo]phenyl]-	2832-40-8	No	No	Yes	No	No	No	No
102	Benzenamine, 4-chloro-2-methyl-, hydrochloride	3165-93-3	No	No	No	Yes	No	No	Yes
103	Cyclohexane, 5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethyl-	4098-71-9	No	Yes	Yes	No	No	No	No
104	Benzene, 1-chloro-4-(trichloromethyl)-	5216-25-1	No	No	No	Yes	No	No	No
105	Cobalt chloride	7646-79-9	No	Yes	Yes	Yes	No	Yes	Yes
106	Zinc chloride	7646-85-7	No	No	No	No	No	No	Yes
107	Chromic acid (Chrome VI)	7738-94-5	Yes						
108	Chromic acid, lead(2+) salt (1:1)	7758-97-6	Yes	No	No	Yes	No	Yes	Yes
109	Chromic acid (H2CrO4), sodium salt (1:2)	7775-11-3	Yes	Yes	Yes	Yes	Yes	Yes	Yes
110	Chromic acid, dipotassium salt	7778-50-9	Yes	Yes	Yes	Yes	Yes	Yes	Yes
111	Phenol, pentachloro-, potassium salt	7778-73-6	No	No	No	No	No	No	Yes
112	Sulfuric acid, nickel(2+) salt (1:1)	7786-81-4	No	Yes	Yes	Yes	No	Yes	Yes
113	Chromic acid, dipotassium salt	7789-00-6	Yes	No	Yes	Yes	Yes	No	Yes
114	Chromic acid, strontium salt (1:1)	7789-06-2	No	No	No	Yes	No	No	Yes
115	Ammonium dichromate	7789-09-5	Yes	Yes	Yes	Yes	Yes	Yes	Yes
116	Chromic acid (H2Cr2O7), disodium salt, dihydrate	7789-12-0	Yes	No	No	No	No	No	No
117	Pyrochlore, antimony lead yellow	8012-00-8	Yes	No	No	No	No	No	No
118	Rosin	8050-09-7	No	No	Yes	No	No	No	No
119	Tall-oil rosin	8052-10-6	No	No	Yes	No	No	No	No
120	Lead dinitrate	10099-74-8	Yes	No	No	No	No	No	No
121	Sulfuric acid, cobalt(2+) salt (1:1)	10124-43-3	No	Yes	Yes	Yes	No	Yes	Yes
122	Nitric acid, cobalt(2+) salt	10141-05-6	No	Yes	Yes	Yes	No	Yes	Yes

123	Chromic acid (H2Cr2O7), sodium salt (1:2)	10588-01-9	Yes	Yes	Yes	Yes	Yes	Yes	Yes
124	Pentalead tetraoxide sulphate	12065-90-6	Yes	No	No	No	No	No	No
125	Trilead dioxide phosphonate	12141-20-7	Yes	No	No	No	No	No	No
126	Boron sodium oxide (B4Na2O7), pentahydrate	12179-04-3	No	No	No	No	No	Yes	No
127	Tetralead trioxide sulphate	12202-17-4	Yes	No	No	No	No	No	No
128	Dioxobis(stearato)trilead	12578-12-0	Yes	No	No	No	No	No	No
129	Lead chromate molybdate sulfate red	12656-85-8	Yes	No	No	Yes	No	Yes	Yes
130	Cuprate(2-), [5-[[4'-[[2,6-dihydro1y-3-[(2-hydro1y-5-sulfophenyl)azo]phenyl]azo][1,1'-biphenyl]-4-yl]azo]-2-hydroxybenzoato(4-)]-, disodium	16071-86-6	No	No	No	Yes	No	No	No
131	Methanesulfonic acid, lead(2+) salt	17570-76-2	No	No	No	No	No	Yes	No
132	Chromic acid, chromium(3+) salt (3:2)	24613-89-6	No	No	Yes	Yes	No	No	Yes
133	Phenol, nonyl-	25154-52-3	No	No	No	No	No	No	Yes
134	Cyclododecane, hexabromo-	25637-99-4	Yes	No	No	No	No	No	No
135	Benzene, 1,1'-oxybis-, pentabromo deriv.	32534-81-9	No	No	No	No	No	No	Yes
136	Benzene, 1,1'-oxybis-, octabromo deriv.	32536-52-0	No	No	No	No	No	Yes	No
137	Acetic acid, lead salt, basic	51404-69-4	Yes	No	No	No	No	No	No
138	1-Aziridinepropanoic acid, 2-[[3-(1-aziridinyl)-1-oxopropoxy]methyl]-2-ethyl-1,3-propanediyl ester	52234-82-9	No	No	Yes	No	No	No	No
139	Polybrominated biphenyls (mix)	59536-65-1	No	No	No	No	No	No	No
140	1,3,5-Triazine-2,4,6(1H,3H,5H)-trione, 1,3,5-tris[(2R)-o1iranylmethyl]-, rel-	59653-74-6	No	No	Yes	No	Yes	No	No
141	Sulfurous acid, lead salt, dibasic	62229-08-7	Yes	No	No	No	No	No	No
142	1,2-Benzenedicarboxylic acid, di-C7-11-alkyl esters, branched and linear	68515-42-4	Yes	No	No	No	No	Yes	No

143	1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters	71888-89-6	Yes	No	No	No	No	Yes	No
144	Pentacosafluorotridecanoic acid (PFTrDA)	72629-94-8	Yes	No	No	No	No	No	No
145	Resin acids and Rosin acids	73138-82-6	No	No	Yes	No	No	No	No
146	1,5-Naphthalenedisulfonic acid, 3,3'-[1,4-piperazinediylbis[(6-chloro-1,3,5-triazine-4,2-diyl)imino[2-(acetylamino)-4,1-phenylene]azo]]bis-, tetrasodium salt	81898-60-4	No	No	Yes	No	No	No	No
147	1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	Yes						
148	3-Pyridinecarbonitrile, 1,2-dihydro-6-hydroxy-4-methyl-1-[3-(1-methylethoxy)propyl]-2-oxo-5-[[4-(phenylazo)phenyl]azo]-	85136-74-9	No	No	No	Yes	No	No	No
149	4,11-Triphenodio1azinedisulfonic acid, 6,13-dichloro-3,10-bis[[3-[[4-[(2,5-disulfophenyl)amino]-6-fluoro-1,3,5-triazin-2-yl]amino]propyl]amino]-, he1asodium salt	85153-92-0	No	Yes	Yes	No	No	No	No
150	Alkanes, C10-13, chloro	85535-84-8	Yes	No	No	No	No	No	Yes
151	Alkanes, C14-17, chloro	85535-85-9	No	No	No	No	No	No	Yes
152	Fatty acids, C16-18, lead salts	91031-62-8	Yes	No	No	No	No	No	No
153	Benzene, 1,1'-methylenebis-, dibromomethyl deriv.	99688-47-8	No	No	Yes	No	No	No	Yes
154	2-Anthracenesulfonic acid, 1-amino-4-[[4-(1,1-dimethylethyl)phenyl]amino]-9,10-dihydro-9,10-dioxo-, monolithium salt	125328-86-1	No	No	Yes	No	No	No	No

155	1,5-Naphthalenedisulfonic acid , 2-[[8-[[4-chloro-6-(ethylphenylamino)-1,3,5-triazin-2-yl]amino]-1-hydroxy-3,6-disulfo-2-naphthalenyl]azo]-, tetrasodium salt	130201-57-9	No	No	Yes	No	No	No	No
156	Benzenesulfonic acid, 4-[[4-chloro-6-(ethylphenylamino)-1,3,5-triazin-2-yl]amino]-2-[[1-(2-chlorophenyl)-5-hydro1y-3-methyl-1H-pyrazol-4-yl]azo]-, monosodium salt	136213-75-7	No	No	Yes	No	No	No	No
157	1,3-Naphthalenedisulfonic acid, 7-[[[3-[[4-[(2-hydro1y-1-naphthalenyl)azo]phenyl]azo]phenyl]sulfonyl]amino]-, potassium sodium salt	141880-36-6	No	No	Yes	No	No	No	No
158	Benzenesulfonic acid, 3-[[2-(acetylamino)-4-[[4-(2-hydro1ybutoxy)phenyl]azo]phenyl]azo]-, monosodium salt	147703-65-9	No	No	Yes	No	No	No	No
159	Glycine, N-[3-(acetylamino)-4-[(2-cyano-4-nitrophenyl)azo]phenyl]-N-(2-methoxy-2-o1oethyl)-, methyl ester	149850-30-6	No	No	Yes	No	No	No	No
160	2,7-Naphthalenedisulfonic acid, 4-amino-6-[[5-[[4-[[8-amino-1-hydro1y-3,6-disulfo-7-[[4-[[2-(sulfooxy)ethyl]sulfonyl]phenyl]azo]-2-naphthalenyl]azo]benzoyl]amino]-2-sulfophenyl]azo]-5-hydroxy-3-[[4-[[2-(sulfooxy)ethyl]sulfonyl]phenyl]azo]-, sodium salt	161935-19-9	No	No	Yes	No	No	No	No
161	Amines, hydrogenated tallow alkyl, reaction products with tetrakis(hydroxymethyl)phosphonium chloride and urea	166242-53-1	No	No	Yes	No	No	No	Yes

162	2,7-Naphthalenedisulfonic acid, 5-[[4-chloro-6-[[2-[[4-chloro-6-[[7-[[4-(ethenylsulfonyl)phenyl]azo]-8-hydroxy-3,6-disulfo-1-naphthalenyl]amino]-1,3,5-triazin-2-yl]amino]ethyl](2-hydroxyethyl)amino]-1,3,5-triazin-2-yl]amino]-3-[[4-(ethenylsulfonyl)phenyl]	171599-85-2	No	No	Yes	No	No	No	No
163	Glycine, N-[13-(acetylamino)phenyl]-N-(carboxymethyl)-, mixed ET and Me diesters, reaction products with diazotied 2-choloro-4-nitrobenzenamine	188070-47-5	No	No	Yes	No	No	No	No
164	2-Anthracenesulfonic acid, 1-amino-4-[(4-amino-2-sulfophenyl)amino]-9,10-dihydro-9,10-dioxo-, disodium salt, reaction products with 2-[[3-[(4,6-dichloro-1,3,5-triazin-2-yl)ethylamino]phenyl]sulfonyl]ethyl hydrogen sulfate, sodium salts	500717-36-2	No	No	Yes	No	No	No	No
165	N-pentyl-isopentylphthalate	776297-69-9	Yes	No	No	No	No	No	No

9.4 Annex 4 Substances for which risk assessments have been performed

There are 54 chemicals from the non-exhaustive list, presented in this report, for which there exist risk assessments performed during the Existing Substances Regulation. Exposure scenarios related to consumer use of textiles are described in the table below when available (lack of scenario is indicated with a "-").

CAS number	Name	Textile related function	Exposure scenarios		Identified risks	
			Human health	Environment	Human health	Environment
71-43-2	Benzene[46]	Benzene is the starting material for the production of cyclohexane, an intermediate in the manufacture of nylon. Nylon plays an important part as synthetic fibre in the manufacture of textiles. Chlorobenzenes are obtained from benzene and are used inter alia as intermediates for the manufacture of, dyestuffs, textile auxiliaries	-	-	-	-
79-01-6	Trichloroethylene[46]	Trichloroethylene is or has been used in the textile processing industry (desizing scouring, dying and cleaning).	-	-	-	-

[46] This chemical is unlikely to be found in the final product. Reference: Stefan Posner and Christina Jönsson at Swerea IVF.

79-06-1	Acrylamide[46]	Polyacrylamides have been used as sizing agents for cotton and as shrink-proofing agents for wool. They have also been used to bind textile fibres and as water repellents. A survey carried out by The International Wool Secretariat has disclosed that polyacrylamide is not used as a sizing agent anywhere within the EU. Thus, there is no known consumer exposure for these applications.	-	-	-	-
79-10-7	Acrylic acid[47]	Acrylate esters are yielded via esterification and are important monomers used in the production of homo- and copolymers which are used for finishing of textiles.	-	-	-	-
79-94-7	2,2',6,6'-tetrabromo-4,4'-isoprppylidenediphenol (tetrabromobisphenol-A or TBBP-A)[48]	Flame retarded polypropylene is used in textiles. However, there is no evidence that TBBP-A is used in textiles worn by	-	-	-	-

[47] This chemical substance does not have the relevant classification according to the hazardous substance criteria of this report.
[48] This chemical is unlikely to be found in the final product. Reference: Stefan Posner and Christina Jönsson at Swerea IVF.

		consumers.				
84-74-2	Dibutyl phthalate (DBP)	It can be used as a softener in PVA adhesives, lacquers, varnishes and printing inks. The main uses of PVA are in textile and paper sizing, as adhesives and as an emulsion-polymerisation aid.	-	-	-	-
85-68-7	Benzyl butyl phthalate (BBP)	PVC coated textiles. Inks used for colour printing on textiles.	-	-	-	-
88-12-0	1-vinyl-2-pyrrolidone[49]	UV curing of inks and coatings	Available measurements indicated that the residual levels are below the dectectable levels. Consumer exposure is therefore considered negligible	-	-	-
90-04-0	o-anisidine	Pigments or dyes based on o-anisidine	Dermal (skin contact with printed packings and foils and dyed textiles)	-	Consumers (via dermal and oral exposure)	-

[49] This chemical substance does not have the relevant classification according to the hazardous substance criteria of this report.

			Oral (sucking textiles coloured with dyes based on the substance) Inhalation (not considered relevant)			
100-42-5	Styrene[49]	-	-	-	-	-
101-77-9	4,4'-methylenedianiline (MDA)	MDA may be used as a dye for textiles.	-	-	-	-
106-46-7	1,4-dichlorobenzene	1,4-dichlorobenzene can be used as carrier for textile dyes mainly polyester and wool dyes but is more and more replaced by alkylnaphthalenes.	-	-	-	-
106-99-0	Buta-1,3-diene[50]	1,3-butadiene is used either as a monomer in the manufacture of a variety of synthetic rubber and plastics, or as an intermediate. Acrylonitrile-butadiene rubber is used for items that must be oil resistant, which includes textiles.	-	-	-	-
107-13-1	Acrylonitrile	The largest use of	Dermal	-	Neglible overall risk (MOS 3000 – 140000).	-

[50] This chemical is unlikely to be found in the final product. Reference: Stefan Posner and Christina Jönsson at Swerea IVF.

		acrylonitrile is the production of acrylic and modacrylic textile fibres. These fibres are used in clothing, domestic furnishings and other industrial purposes.	Inhalation (Via release from carpets/textiles)		However, given that acrylonitrile is considered to be a carcinogen for which a threshold cannot be reliably identified, the following conclusions are reached: Conclusion (iii) There is a need for limiting the risks; risk reduction measures which are already being applied shall be taken into account. This conclusion is reached because of: • concerns for carcinogenicity. Risks cannot be excluded for all exposure scenarios, as the substance is identified as a nonthreshold carcinogen.	
107-64-2	1-Octadecanaminium, N,N-dimethyl-N-octadecyl-, chloride (Dimethyldioctadecylammonium chloride, DHTDMAC)	DHTDMAC is used as a fabric softener in hand laundering products. Textiles may also contain the substance after washing.	-	-	-	-

108-88-3	Toluen[51]	Toluene may be included in textile processing in gluing of textile material	-	-	-	-
110-49-6	2-methoxyethyl acetate	No RAR available	-	-	-	-
110-80-5	2-ethoxyethanol	-	-	-	-	-
110-82-7	Cyclohexan	Cyclohexan may be included in textile processing in gluing of textile material	-	-	-	-
111-15-9	2-etoxietylacetat[52]	2-etoxietylacetat may be used as solvents for dyes in textile finishing	-	-	-	-
111-76-2	2-Butoxietanol[51]	-	-	-	-	-
115-96-8	Tris(2-chloroethyl)phosphate (TCEP)	TCEP is a flame-retardant plasticiser which is used in furniture and textile industry.	Inhalation (Adults and children) Dermal (Adults and children) Oral (Adults, children and babies)			
117-81-7	Bis(2-ethylhexyl) phthalate (di-2-ethylhexyl phthalate, DEHP)	This compound is common in the class of	-	-	-	-

[51] This chemical substance does not have the relevant classification according to the hazardous substance criteria of this report.
[52] This chemical may not be found in the final product. Reference: Stefan Posner and Christina Jönsson at Swerea IVF.

		phthalate plasticisers. It is also used in printing inks for textiles and may be used in plastisol applications were the paste is homogenised onto the tissue to be coated (e.g. coated fabric textile).				
117-84-0	Dioctyl phthalate[53]	No RAR available	-	-	-	-
120-82-1	1,2,4-trichlorobenzene (1,2,4-TBC)	1,2,4-TBC is used as a dye carrier in the textile industry	-	-	-	-
122-39-4	Diphenylamine[53]	-	-	-	-	-
1163-19-5	Decabromodiphenyl ether (DecaBDE)	Decabromodiphenyl ether is used as a flame retardant. It is mostly used in applications in the plastics and textile industries.	Dermal (Dermal exposure could however not be assessed since no data on leaching was available, but given the low frequency and duration of any dermal contact, dermal exposure with textiles is expected to be very low)	-	Oral (Babies)	-
1309-64-4	Antimony trioxide[53]	Antimony trioxide may be used as a flame retardant	Dermal (adult sitting on	-	-	-

[53] This chemical substance does not have the relevant classification according to the hazardous substance criteria of this report.

		in textiles.	upholstery fabric) Oral (child sucking cuddly toys) Oral (hild ingestion of dust from indoor air)			
1330-43-4	Disodium tetraborate, anhydrous[54]	Borates (boric acid and sodium tetraborate pentahydrate) are important ingredients in both insulation fibresglass - which represents the largest single use of borates worldwide - and textile fibresglass, used in everything from circuit boards to surfboards.	-	-	-	-
1333-82-0	Chromium trioxide	Chromium compounds are used in the textile industry as mordants (to fix dye colours in fabrics).	-	-	-	-
7440-02-0	Nickel	Stainless steel details in textiles (e.g. buttons), textile printing, dyes for colouration of textiles.	-	-	-	-
7440-43-9	Cadmium	Dyestuff, pigments.	-	-	-	-

[54] This chemical substance does not have the relevant classification according to the hazardous substance criteria of this report.

7440-66-6	Zinc	Zinc is used in textile finishing and processing industries.	-	-	-	-
7722-84-1	Hydrogen peroxide[55]	Hydrogen peroxide is used for textile bleaching in the textile industry, industrial laundries and by consumers.	Dermal (Textile bleaching) Inhalation (Textile bleaching) Oral (Textile bleaching) Eye (Textile bleaching)		Consumers (concerns for eye irritation/corrosivity in use of textile bleaches and cleaning agents, if the actual concentration of hydrogen peroxide is >5%.	
7646-85-7	Zinc chloride	Zinc chloride is used as a part of cationic dyes. It is not clear if zinc chloride is used in the synthesis to make dyes or if it is an actual substance of dyes, which could result in releases also at the processing stage. Zinc chloride solution dissolves vegetable fibres and is widely used in mercerising cotton, swelling fibres, dyeing. It can also be used in textile preservation.	-	-	-	-

[55] This chemical substance does not have the relevant classification according to the hazardous substance criteria of this report.

7775-11-3	Sodium chromate	Chromium compounds are used in the textile industry as mordants (to fix dye colours in fabrics).	-	-	-	-
7778-50-9	Potassium dichromate	Chromium compounds are used in the textile industry as mordants (to fix dye colours in fabrics).	-	-	-	-
7786-81-4	Nickel sulphate	Nickel alloys in buttons etc. in textiles. Nickel compounds may be available in pigments used in textiles.	-	-	-	-
10043-35-3	Boric acid, crude natural[56]	Borates (boric acid and sodium tetraborate pentahydrate) are an important ingredient in both insulation fibresglass - which represents the largest single use of borates worldwide - and textile fibresglass, used in everything from circuit boards to surfboards.	-	-	-	-
10588-01-9	Sodium dichromate	Chromium compounds are used in the textile industry as mordants (to fix dye colours in fabrics).	-	-	-	-
11113-50-1	Boric acid[56]	Borates (boric acid and	-	-	-	-

[56] This chemical substance does not have the relevant classification according to the hazardous substance criteria of this report.

		sodium tetraborate pentahydrate) are important ingredients in both insulation fibresglass - which represents the largest single use of borates worldwide - and textile fibresglass, used in everything from circuit boards to surfboards.				
13674-84-5	Tris(2-chloro-1-methylethyl) phosphate (TCPP)[57]	TCPP is a flame retardant used in polyurethane (PU) rigid and flexible foam, PVC, EVA and phenolics and epoxy resin. Very small use of TCPP also exists in textile back-coating formulations and in certain coatings.	-	-	-	-
13674-87-8	Tris[2-chloro-1-(chloromethyl)ethyl] phosphate (TDCP)[57]	TDCP is a flame retardant which may be used in foams etc., for instance furniture foam, etc. It is not produced anymore within the EU	-	-	-	-
25637-99-4	Hexabromocyclododecane (HBCDD)	HBCDD is used as a textile coating agent. HBCDD is a flame retardant, on its own or in combination with other	Oral (exposure to dust) - was considered insignificant and not brought	-	-	-

[57] This chemical substance does not have the relevant classification according to the hazardous substance criteria of this report.

		flame retardants.	forward to the risk characterisation Inhalation (exposure to dust) - was considered insignificant and not brought forward to the risk characterisation Oral (exposure by mouthing of textile)			
26761-40-0	Di-" isodecyl" phthalate (DIDP)[58]	May be used as softeners in printing inks used in the textile industry.	-	-	-	-
28553-12-0	Di-"isononyl" phthalate (DIPN)[58]	May be used in textile spread coating.	-	-	-	-
30899-19-5	Pentanol[58]	RAR not available	-	-	-	-
32534-81-9	Diphenyl ether, pentabromo derivative	Pentabromodiphenyl ether have in the past been used as a flame retardant in some textile applications (e.g. speciality fire-resistant clothing using polyurethane treatment, and in polyurethane coatings in carpets). The	-	-	-	-

[58] This chemical substance does not have the relevant classification according to the hazardous substance criteria of this report.

		substance is no longer used in this application in the EU.				
32536-52-0	Diphenyl ether, octabromo derivative	The polybrominated diphenyl ethers in general are used as flame retardants. They are mostly used in applications in the plastics and textile industries (decabromodiphenyl ether only).	-	-	-	-
38051-10-4	2,2-bis(chloromethyl)trimethylene bis(bis(2-chloroethyl)phosphate)[58]	Included in flame-retarded foam which may be covered by textiles.	-	-	-	-
65996-93-2	Pitch, coal tar, high-temp	The largest industrial emission sources to water are the pre-treatment of fibres or textiles	-	-	-	-
85535-84-8	Alkanes, C10-13, chloro (SCCP)	The highly chlorinated short chain length chlorinated paraffins can be used in the production of flame-resistant, water repellent and rot-preventing textile finishes. Information provided by the Chlorinated Paraffins Sector Group of Euro-Chlor indicate that current usage of short chain length chlorinated	For the purposes of risk assessment, exposure by both the inhalation and dermal routes via textiles may be considered to be negligible.	-	-	-

		paraffins in textiles in the EU is very low, with the majority being used in back coating of textiles (the short chain length chlorinated paraffin is applied to the textile in a polymer matrix), with smaller amounts being used in other textile treatments.				
85535-85-9	Alkanes, C14-17, chloro (MCCP)	Alkanes may be used for PVC applications used in textiles.	-	-	-	-

9.5 Annex 5 The textile process chain

The textile process chain with examples of chemicals and auxiliaries used, there chemical composition, examples of their effects and in which steps of the process they can be used (BAT, 2003).

Process	Chemical agents	Effect	Chemical composition
Manufacturing of man-made fibres, coning, texturisingtexturising, spinning, twisting, winding, warping, weaving, knitting	Preparation agents (preparation agents for primary spinning, lubricants, conditioning agents, coning oils, warping oils, twisting oils, knitting oils)	Increasing processability, protection of fibres/yarns; adjusting of friction properties; impart of antielectrostatic properties; improve of coning, texturising etc.	Mineral oils, common fatty acid esters, ethylene oxide-propylene oxide adducts, hindered fatty acid esters, polyolesters, polyester-polyethercarbonates, silicones, additives (emulsifiers, antistatic agents, corrosion inhibitors, anionic/non-ionic surfactants)
Sizing	Sizing agents, sizing additives	Protection of warp yarns during weaving (Applied in weaving mills)	Macro-molecular natural or synthetic products (starch, modified starch, modified cellulosis, polyvinyl alcohol, polyacrylates, polyesters) Additives (oils, waxes, starch solubilising agents (peroxides))
Pre-treatment			
All pre-treatment steps	Fibre protecting agents	Protection of the fibre and reduction of affection of the fibre during pre-treatment processes	Protein fatty acid condensates and Guanidinium derivatives
Desizing	Desizing agents	Removal of sizing agents	Enzymes (amylases) for enzymatic desizing; mono- and dipersulfates for oxidative desizing; surfactants, complexing agents
Scouring (kierboiling)	Scouring auxiliaries	Removal of fibre by-products (fats, waxes, pectines, inorganics etc.) from cellulose fibres in cellulose materials or blends of cellulose fibres with synthetic fibres	Strong alkali; alkaline-resistant and electrolyte resistant surfactants (fatty alcohol ethoxylates, alkane sulfonates), complexing agents

Bleaching	Bleaching auxiliaries	Bleaching, whitening.	Peroxide, sodium chlorite, sodium hydroxide, complexing agents, surfactants stable in acidic or alkali conditions, silicates, polycarboxylic acids, sugar polymers as peroxide stabilisers, nitrates (anti-corrosion), polyacrylamide (crease-preventing) sodium sulfite, enzymes (catalases) to remove peroxide surplus
Mercerising	Mercerising auxiliaries	Increase in dyestuff uptake and tensile strength of textiles by means of alkali treatment under tension	Strong alkali (sodium hydroxide; ammonia); wetting agents, stable in highly concentrated lyes (low molecular weight alkyl sulfates, alkane sulfonates), antifoaming agents as shorter-chain alkyl phosphates, complexing agents
Process	**Auxiliary**	**Effect**	**Chemical composition**
Causticising	Causticisingg auxiliaries	See mercerising (no tension applied to textile)	See mercerising
Carbonising	Carbonising auxiliaries	Removal of vegetable impurities with acid or acid salts	Strong sulfuric acid, acid-stable wetting agents (alkyl arylsulfates, alkane sulfonates, fatty alcohol ethoxylates)
Optical bleaching	Fluorescent brighteners	Whitening	Stilbene, pyrazoline or benzeneazole derivatives
Dyeing/Printing			
Dissolving of dyestuffs	Dyestuff solubilising and hydrotropic agents	Promotion of the dissolution of dyestuffs in water	Alcohols, polyols, fatty alc ohol ethoxylates, esters
Dissolving of dyestuffs	Dispersing agents protective colloids	Promotion of the formation and stability of dyestuff and pigment dispersions	Naphthalene sulfonic acid formaldehyde condensates, naphthaline sulfonates, lignosulfonates, fatty alcohol ethoxilates, alkylsulfonates, alkylaryl sulfonates, polyacrylates
Exhaust dyeing, padding processes	Wetting agents deaeration agents	Increase of wetting capacity of the dye liquors; improve of dye penetration in padding processes; increase of dye absorption	Alkylsulfates, alkanesulfonates, alkylarylsulfonates, salts of sulfosuccinic acid esters, fatty alcohol ethoxilates, alcohols of higher valence, phosphoric acid esters, hydrocarbons.

Levelling	Retarding agents, migration agents, compensating agents, penetrating agents	Promotion of an even distribution of dyestuffs in the textiles	Alkyl -, alkyl aryl -, alkyl amine - and alkyl aryl amine ethoxylates, fatty acid esters and amides, fatty acid condensates, polyvinyl pyrrolidone, quaternary ammonium salts, alkyl sulfates, alkyl aryl sulfonates
Exhaust dyeing (esp. PES, PES/WO)	Carriers	Acceleration of dye absorption, dye diffusion esp. for PES and PES/WO dyeing	Aromatic hydrocarbons, chlorinated aromatic compounds, benzoic acid esters (benzylbenzoate) phthalic acid esters, alkyl phthalimides, alkylphenolethoxilates
Skein dyeing of piece goods	Crease preventing agents	Crease preventing esp. during skein-dyeing of piece goods	Polyglykolethers, polyamide, polyacrylates, fatty alcohol ethoxilates, phosphoric acid esters, fatty acid esters
Exhaust dyeing	Dyestuff protecting agents, boildown protecting agents	Protection of dyestuffs during application from destruction by foreign matters with a reducing effect	Buffers and/or oxidisingoxidising substances (nitrobenzene sulfonate), urea, alkylarylsulfonates

9.6 Annex 6 Results from the Swedish Chemicals Agency survey of textile analyses made during the year 2005-2012

Results from the Swedish chemicals agency survey of textile analyses made during the years 2005-2012. In total from13 different references and these are summarised in the table below.

Chemical substance	CAS number	Sources	Concentration range	Uses	References
Perfluorinated compounds			**µg/m^2**		
PFOA	335-67-1	Carpets, furniture textile, weather proof jackets	0,4-3,74	Soil and water repellance	Herzke et al., 2012. Greenpeace, 2012.
PFOS	1763-23-1	Carpets	0,71-1,04	Soil and water repellance	Herzke et al., 2012.
Other perfluorinated compounds		Carpets, furniture textile, weather proof jackets	0,38-368	Soil and water repellance	Herzke et al., 2012. Greenpeace, 2012.
Phthalates			**mg/kg**		
Di-(2-etylhexyl) phthalate (DEHP)	117-81-7	T-shirt prints, oilcloths, shower curtains, toilet bags, backpacks, mittens, weather proof jackets	12 - 300 000	Plasticisers, softeners	Kemikalieinspektionen, 2013. Göteborgs stad miljöförvaltning, 2009.Tønning et al., 2010. Klif, 2010. Greenpeace, 2012.

Dibutyl phthalate (DBP)	84-74-2	T-shirt prints, Weather proof jackets	9 - 290	Plasticisers, softeners, solvents	Kemikalieinspektionen, 2013. Göteborgs stad miljöförvaltning, 2009. Tønning et al., 2010. Greenpeace, 2012.
Di-iso-decyl phthalate (DIDP)	26761-40-0	T-shirt prints	630 - 16000	Plasticisers, softeners	Kemikalieinspektionen, 2013.
Di-iso-nonyl phthalate (DINP)	68515-48-0	T-shirt prints, Weather proof jackets	1800-86000	Plasticisers, softeners	Kemikalieinspektionen, 2013. IMS, 2010. Greenpeace, 2012.
Di-n-octyl phthalate (DNOP)	117-84-0	T-shirt prints	60	Plasticisers, softeners, solvents	Göteborgs stad miljöförvaltning, 2009.
Butyl benzyl phthalate (BBP)	85-68-7	T-shirt prints	300 - 5700	Plasticisers, softeners	Kemikalieinspektionen, 2013. Göteborgs stad miljöförvaltning, 2009.
Elements			**mg/kg**		
Antimony (Sb)	7440-36-0	Jacket, mittens, towels	0,2 - 200	Catalyst, Flame reatardant (Antimony oxide 1309-64-4)	Tønning et al., 2009. Naturskyddföreningen, 2007. Greenpeace, 2012.
Arsenic (As)	7440-38-2	Towels	0,054	Pesticides	Naturskyddföreningen, 2007.
Barium (Ba)	7440-39-3	Strollers clothing and foam	12,5		Kemikalieinspektionen, 2013.
Brom (Br)	7726-95-6	Mitten, Towels	1,5 - 660		Tønning et al., 2009. Naturskyddföreningen, 2007.
Cadmium (Cd)	7440-43-9	Towels	0,016 - 0,11	Pigment, stabilizer	Naturskyddföreningen, 2007.
Chromium (Cr)	7440-47-3	Towels	0,093 - 4,5	Pigment	Naturskyddföreningen, 2007.

Cobalt (Co)	7440-48-4	Towels	0,02-0,082	Pigment	Naturskyddföreningen, 2007.
Copper (Cu)	7440-50-8	Towels	0,05-73		Naturskyddföreningen, 2007.
Fluor (F)	7782-41-4	Jackets, mittens, towels	230 - 140000		Tønning et al., 2009. Naturskyddföreningen, 2007.
Silver (Ag)	7440-22-4	Sportswear, Pyjamas, Body	0,4-38,8	Biocides, antibacteriel	Kemikalieinspektionen, 2011.
Lead (Pb)	7439-92-1	Car seat (leather imitation), towels	0,02-7,5	Pigment, stabilizer	Kemikalieinspektionen, 2013. Naturskyddföreningen, 2007.
Vanadium(V)	7440-62-2	Towels	0,05-0,21		Naturskyddföreningen, 2007.
Zink (Zn)	7440-66-6	Towels	0,5-120	Biocides	Naturskyddföreningen, 2007.
Flame retardants			**mg/kg**		
Decabromodiphenyl Ether (DecaDBE)	1163-19-5	Car seats foam and clothing	19	Flame reardants	Kemikalieinspektionen, 2013.
Isocyanates			**mg/kg**		
Methylene diphenyl diisocyanate (MDI)	101-68-8 or 26447-40-5	Jackets, Mittens	130-2900	Precursor in manufacturing of polyurethane	Tønning et al., 2009.
Toluene diisocyanate (TDI)	26471-62-5	Matresses foam, weather proof jackets	5.-23	Precursor in manufacturing of polyurethane	Kemikalieinspektionen, 2013. Greenpeace, 2012.
Phenyl isocyanate	103-71-9	Children's sheets	220	Precursor in manufacturing of polyurethane	Tønning et al., 2009.

Various Isocyanates		Jackets, mittens	75 - 2900	Precursor in manufacturing of polyurethane	Tønning et al., 2009.
Organic tin compounds			**mg/kg**	Stabilisers, catalyst	
Dibutyl tin	1978-04-06	Car seats foam	0,012	Stabilisers, catalyst in the production of foam plastics, biocides, antibacterial	Kemikalieinspektionen, 2013.
Di-octyl tin	870-08-6	Matresses foam	0,01	Stabilisers, catalyst in the production of foam plastics, biocides, antibacterial	Kemikalieinspektionen, 2013.
Monobutyl tin	51590-67-1	Matresses foam	0,02	Stabilisers, catalyst in the production of foam plastics, biocides, antibacterial	Kemikalieinspektionen, 2013.
Mono-octyl tin	30862-33-0	Matresses foam	0,02-0,06	Stabilisers, catalyst in the production of foam plastics, biocides, antibacterial	Kemikalieinspektionen, 2013.

Tetrabutyl tin		Matresses foam	0,03-0,06	Stabilisers, catalyst in the production of foam plastics, biocides, antibacterial	Kemikalieinspektionen, 2013.
Antibacterial substances			**mg/kg**		
Triclocarban	101-20-2	Sportswear	4,4	Biocides, antibacterial	Kemikalieinspektionen, 2011.
Triclosan	3380-34-5	Sportswear	48,9	Biocides, antibacterial	Kemikalieinspektionen, 2011.
Free aryl amines from disperse dyes			**mg/kg**	Aryl amines from cleavable azo dyestuffs	
2,4-toluylendiamine	95-80-7	Car seats	96	Arylamines from cleavable azo dyestuffs	Kemikalieinspektionen, 2013.
4,4'-Dimethoxybenzidine	101-77-9	Car seats	6	Arylamines from cleavable azo dyestuffs	Kemikalieinspektionen, 2013.
Dichloroanilines	several	Children's sheets	130	Arylamines from cleavable azo dyestuffs	Tønning et al., 2009.
Aniline	62-53-3	Car seats, sheets	24 - 157	Arylamines from cleavable azo dyestuffs	Kemikalieinspektionen, 2013. Tønning et al., 2009.

Other organic compounds			**mg/kg**		
Formaldehyde	50-00-0	Strollers clothing and foam, matrasses, car seats (fabric and foam), jackets, mittens, towels, sheets	11 - 58	Biocides, solvents	Kemikalieinspektionen, 2013. Tønning et al., 2009. Naturskyddföreningen, 2007.
Nonylphenol ethoxylate	9016-45-9	T-shirts, towels, weather proof jackets, jeans, pyjamas, snowsuits, underwear	2 - 10608	Surfactant	Kemikalieinspektionen, 2013. Naturskyddföreningen, 2008. Naturskyddföreningen, 2007. Greenpeace, 2012. Rasmussen et al. 2012
2-Ethylhexanoic acid	149-57-5	Matrasses foam	400	Solvents	Kemikalieinspektionen, 2013.
Urea	57-13-6	Children's sheets	210	Antiwrinkle agent	Tønning et al., 2009.
Various glycols		Children's sheets	49	Antistatic agents	Tønning et al., 2009.
Dimethyl pyridines	109-06-8	Children's sheets	33		Tønning et al., 2009.
Aliphatic hydrocarbons		Jackets, Mittens	6100		Tønning et al., 2009.

9.7 Annex 7 Chemicals on the REACH Candidate List and in other Annexes of REACH

Chemicals on the Candidate List and in other Annexes of REACH that are linked to textile products (Swerea IVF database, 2013)

CAS No	Substance name	Materials	Category	Included in REACH candidate list	Included in REACH Annex XIV	REACH Annex XVII
56-35-9	Bis(tributyltin)oxide	Cotton and similar seed fibres, flax, leather, polyester	Biocides, Solvents	Yes	No	Yes
60-09-3	4-Aminoazobenzene	Acetate, acrylic, cotton and similar seed fibres, flax, leather, modacrylic, polyamide, polyester, polyurethane, viscose (regenerated cellulose), wool, wool and similar animal fibres	Arylamines from cleavable azo dyestuffs	Yes	No	Yes
68-12-2	N,N-dimethylformamide	Polyurethane	Solvents	Yes	No	*- no data available -*
79-01-6	Trichloroethylene	*- no data available -*	Solvents	Yes	No	*- no data available -*
84-69-5	Diisobutyl phthalate (DIBP)	Polyvinylchloride (PVC), rubber	Plasticisers / softeners	Yes	Yes	No
84-74-2	Dibutyl phthalate (DBP)	Polyvinylchloride (PVC)	Plasticisers / softeners, solvents	Yes	Yes	Yes
85-68-7	Butylbenzyl phthalate (BBP)	Polyvinylchloride (PVC)	Plasticisers / softeners	Yes	Yes	Yes
90-94-8	4,4""-bis(dimethylamino)benzophenone	*- no data available -*	Pigment	Yes	No	*- no data available -*

92-67-1	Biphenyl-4-ylamine	Cotton and similar seed fibres, flax, leather, polyamide, viscose (regenerated cellulose), wool, wool and similar animal fibres	Arylamines from cleavable azo dyestuffs	Yes	No	Yes
95-53-4	o-Toluidine	Acetate, cotton and similar seed fibres, flax, leather, modacrylic, polyamide, polyester, polyurethane, viscose (regenerated cellulose), wool, wool and similar animal fibres	Arylamines from cleavable azo dyestuffs	Yes	No	Yes
95-80-7	4-methyl-m-phenylenediamine	Acetate, acrylic, cotton and similar seed fibres, flax, leather, modacrylic, polyamide, polyurethane, viscose (regenerated cellulose), wool, wool and similar animal fibres	Arylamines from cleavable azo dyestuffs	Yes	No	Yes
97-56-3	o-Aminoazotoluene	Acetate, acrylic, cotton and similar seed fibres, flax, leather, modacrylic, polyamide, polyester, polyurethane, viscose (regenerated cellulose), wool, wool and similar animal fibres	Arylamines from cleavable azo dyestuffs	Yes	No	Yes
101-14-4	4,4-Methylene-bis[2-chloro-aniline]	Acetate, acrylic, cotton and similar seed fibres, flax, leather, modacrylic, polyamide, polyester, polyurethane, viscose (regenerated cellulose), wool	Arylamines from cleavable azo dyestuffs	Yes	No	Yes

101-61-1	N,N,N'''''',N''''''-tetramethyl-4,4''''''-methylenedianiline	Acetate, acrylic, cotton and similar seed fibres, flax, leather, polyamide, silk (natural), viscose (regenerated cellulose), wool, wool and similar animal fibres	Carcinogenic dyestuffs, Pigment	Yes	No	*- no data available -*
101-80-4	4,4''''-oxydianiline	Acetate, acrylic, cotton and similar seed fibres, flax, leather, modacrylic, polyamide, polyester, polyurethane, viscose (regenerated cellulose), wool, wool and similar animal fibres	Arylamines from cleavable azo dyestuffs	Yes	No	Yes
115-96-8	Tris(2-chloroethyl) phosphate (TCEP)	Polyester, polyurethane, polyvinylchloride (PVC)	Flame retardants, Plasticisers / softeners	Yes	Yes	No
117-81-7	Di-(2-Ethylhexyl)-phthalate (DEHP)	Polyvinylchloride (PVC), rubber	Plasticisers / softeners	Yes	Yes	Yes
117-82-8	Bis(2-methoxyethyl)phthalate	Acetate, polyvinylchloride (PVC)	Plasticisers	Yes	No	*- no data available -*
120-71-8	p-Cresidine	Acetate, acrylic, cotton and similar seed fibres, flax, leather, modacrylic, polyamide, polyester, polyurethane, viscose (regenerated cellulose), wool, wool and similar animal fibres	Arylamines from cleavable azo dyestuffs	Yes	No	Yes
127-19-5	Dimethylacetamide	Acrylic, polyamide, polyurethane	Solvents	Yes	No	No
302-01-2	Hydrazine	*- no data available -*	Solvents	Yes	No	Yes
307-55-1	Tricosafluorododecanoic acid (PFDoA)	*- no data available -*	Soil and water repellence	Yes	*- no data available -*	*- no data available -*

376-06-7	Heptacosafluorotetradecanoic acid (PFTA)	*- no data available -*	Soil and water repellence	Yes	*- no data available -*	*- no data available -*
548-62-9	[4-[4,4'''''-bis(dimethylamino) benzhydrylidene]cyclohexa-2,5-dien-1-ylidene]dimethylammonium chloride	Acetate, acrylic, cotton and similar seed fibres, flax, leather, polyamide, silk (natural), viscose (regenerated cellulose), wool, wool and similar animal fibres	Carcinogenic dyestuffs, Pigment	Yes	No	*- no data available -*
561-41-1	4,4''-bis(dimethylamino)-4'''''-(methylamino)trityl alcohol	Acetate, acrylic, cotton and similar seed fibres, flax, leather, polyamide, silk, silk (natural), viscose (regenerated cellulose), wool and similar animal fibres	Carcinogenic dyestuffs, Pigment	Yes	No	*- no data available -*
605-50-5	Diisopentylphthalate (DIPP)	*- no data available -*	Plasticisers	Yes	No	*- no data available -*
683-18-1	Dibutyltin dichloride (DBTC)	Polyurethane, polyvinylchloride (PVC), rubber	Catalyst, stabilizers	Yes	No	*- no data available -*
838-88-0	4,4-Methylenedi-o-toluidine	Acetate, acrylic, cotton and similar seed fibres, flax, leather, modacrylic, polyamide, polyester, polyurethane, viscose (regenerated cellulose), wool, wool and similar animal fibres	Arylamines from cleavable azo dyestuffs	Yes	No	Yes
872-50-4	NMP	*- no data available -*	Solvents	Yes	No	Yes

1163-19-5	Decabromobiphenyl oxide	Acetate, acrylic, cotton and similar seed fibres, flax, polyamide, polyester, polyethylene, polypropylene, polyurethane, viscose (regenerated cellulose)	Flame retardants	Yes	No	No
1314-41-6	Lead tetroxide	Polyvinylchloride (PVC)	Pigment, Stabilizers	Yes	No	*- no data available -*
1344-37-2	Lead sulfochromate yellow	Leather, polyvinylchloride (PVC)	Pigment	Yes	Yes	*- no data available -*
1763-23-1	1-Octanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-	*- no data available -*	Soil and water repellence	Yes	No	*- no data available -*
2058-94-8	Henicosafluoroundecanoic acid	*- no data available -*	Soil and water repellence	Yes	No	*- no data available -*
2580-56-5	[4-[[4-anilino-1-naphthyl][4-(dimethylamino)phenyl]methylene]cyclohexa-2,5-dien-1-ylidene] dimethylammonium chloride	Acetate, acrylic, cotton and similar seed fibres, flax, leather, polyamide, silk (natural), viscose (regenerated cellulose), wool, wool and similar animal fibres	Carcinogenic dyestuffs, Pigment	Yes	No	*- no data available -*
6786-83-0	a,a-Bis[4-(dimethylamino)phenyl]-4 (phenylamino)naphthalene-1-methanol	Acetate, acrylic, cotton and similar seed fibres, flax, leather, polyamide, silk (natural), viscose (regenerated cellulose), wool, Wool and similar animal fibres	Carcinogenic dyestuffs, Pigment	Yes	No	*- no data available -*
7758-97-6	Lead chromate	Polyvinylchloride (PVC)	Pigment	Yes	Yes	Yes
7775-11-3	Sodium Chromate	Leather, silk (natural), wool	Pigment	Yes	No	*- no data available -*

7778-50-9	Potassium dichromate	Polyamide, silk (natural), steel, wool and similar animal fibres	Pigment	Yes	No	*- no data available -*
7789-00-6	Potassium chromate	Leather, silk (natural), steel, wool	Pigment	Yes	No	*- no data available -*
7789-09-5	Ammonium dichromate	Polyamide, silk (natural), steel, wool, wool and similar animal fibres	Pigment	Yes	No	*- no data available -*
7789-12-0	Sodium dichromate	Polyamide, silk (natural), steel, wool	Pigment	Yes	No	*- no data available -*
8012-00-8	Pyrochlore, antimony lead yellow	*- no data available -*	Pigment	Yes	No	*- no data available -*
10099-74-8	Lead dinitrate	Polyamide, polyester, polyvinylchloride (PVC)	Stabilizers	Yes	No	*- no data available -*
10588-01-9	Chromic acid, disodium salt, dihydrate, (chrome VI)	Leather, polyamide, silk, wool	Pigment	Yes	No	Yes
12065-90-6	Pentalead tetraoxide sulphate	Polyvinylchloride (PVC)	Stabilizers	Yes	No	*- no data available -*
12141-20-7	Trilead dioxide phosphonate	Polyvinylchloride (PVC)	Stabilizers	Yes	No	*- no data available -*
12202-17-4	Tetralead trioxide sulphate	Polyvinylchloride (PVC)	Stabilizers	Yes	No	*- no data available -*
12578-12-0	Dioxobis(stearato)trilead	Polyvinylchloride (PVC)	Stabilizers	Yes	No	*- no data available -*
12656-85-8	Lead chromate molybdate sulfate red	Polyvinylchloride (PVC)	Pigment	Yes	Yes	*- no data available -*
25637-99-4	Hexabromocyclododecane (HBCDD)	Cotton and similar seed fibres, flax, polyester, polypropylene, polyurethane	Flame retardants	Yes	Yes	No
51404-69-4	Acetic acid, lead salt, basic	Leather, silk (natural), wool and similar animal fibres	Carcinogenic dyestuffs	Yes	No	*- no data available -*

62229-08-7	Sulfurous acid, lead salt, dibasic	Polyvinylchloride (PVC)	Stabilizers	Yes	No	*- no data available -*
68515-42-4	DHNUP	Polyvinylchloride (PVC)	Plasticisers / softeners	Yes	No	*- no data available -*
71888-89-6	DIHP	Polyvinylchloride (PVC)	Plasticisers / softeners	Yes	No	*- no data available -*
84777-06-0	1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	Polyvinylchloride (PVC)	Plasticisers	Yes	No	*- no data available -*
85535-84-8	Chlorinated paraffines (short chained)	Leather, polyester, polyethylene, polypropylene, polyvinylchloride (PVC), rubber	Flame retardants, plasticisers / softeners	Yes	No	Yes
91031-62-8	Fatty acids, C16-18, lead salts	Polyvinylchloride (PVC)	Stabilizers	Yes	No	*- no data available -*
72629-94-8	Pentacosafluorotridecanoic acid (PFTrDA)	*- no data available -*	Soil and water repellence	Yes	*- no data available -*	*- no data available -*
776297-69-9	N-pentyl-isopentylphthalate	Polyvinylchloride (PVC)	Plasticisers	Yes	No	*- no data available -*

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