

Analyses by the Swedish Chemicals Agency
in connection with enforcement 2008-2013

ENFORCEMENT 6/14



The Swedish Chemicals Agency is supervisory authority under the Government. We work in Sweden, the EU and internationally to develop legislation and other incentives to promote good health and improved environment. We monitor compliance of applicable rules on chemical products, pesticides and substances in articles and carry out inspections. We review and authorise pesticides before they can be used. Our environmental quality objective is A Non-toxic Environment.

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Foreword

The Swedish Chemicals Agency is the central enforcement authority for rules in the area of chemicals. Part of the Agency's inspection activity consists in conducting chemical analyses of products to check that they do not contain chemical substances and substances that are restricted by law. In the last few years we have conducted more analyses than previously, and this report represents a synopsis of the analyses performed between 2008 and 2013. The synopsis has been compiled by Frida Ramström of the Enforcement of Rules – Pesticides and Articles Unit.

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Summary

The Swedish Chemical Agency's Enforcement and Registries Department makes inspections of companies manufacturing, importing and providing chemical products and articles that have been treated with or contain chemical substances. One part of the inspection activity includes chemical analyses of products to check that they fulfill the requirements of the legislation. This report is an account of analyses made by the Enforcement Department during 2008 to 2013.

The enforcement often focuses on a certain group of articles and this report presents the results of the analyses of different kinds of products. The largest number of analyses were made of toys and articles for children. Phthalates in soft plastic toys and lead in electrical toys were common substances found by the analyses. When electronics was checked, lead was most often found. In analyses made for the Swedish Chemicals Agency of clothing, shoes and accessories, we found nonyletoxylates in clothing, phthalates in plastic shoes and lead, cadmium and nickel in jewellery. Tests of building and interior products showed that plastic floors contain phthalates and that the design of oil lamps does not fulfill the safety requirements in the legislation. Analyses of sport articles showed content of phthalates and short-chained chlorinated paraffins and packagings of plastics showed content of cadmium. When chemical products were analysed, polycyclic aromatic hydrocarbons (PAH) were found in tattoo inks, and hexachlorobenzene was found in fireworks and toluene in adhesives.

The results of the analyses are primarily used in the Swedish Chemical Agency's enforcement matters. Experiences from the analyses can be used also when new rules are developed and to spread information to other countries' enforcement authorities. Companies could moreover find the information useful when they check their own products.

Product groups with the largest number of analyses are toys and other articles for children. One reason for this is that there are many applicable rules to check for these articles and the Swedish Chemicals Agency has prioritised efforts that protect children. However, children come into contact with many other types of products in homes and schools and the Swedish Chemicals Agency therefore intends to continue checking and analysing different kinds of consumer products.

Sammanfattning

Kemikalieinspektionens tillsynsavdelning inspekterar företag som tillverkar, importerar och säljer kemiska produkter och varor som har behandlats med eller innehåller kemiska ämnen. En del av kontrollen är att kemiska analyser utförs på produkter för att kontrollera att produkterna klarar de krav som finns i lagstiftningen. Denna rapport är en sammanställning av de analyser som tillsynsavdelningen har gjort under 2008 till 2013.

Tillsynen fokuserar ofta på en viss varugrupp och i denna rapport redovisas analysresultaten uppdelade på olika sorters produkter. Flest analyser har utförts på leksaker och barnavårdsartiklar. Vanliga ämnen som har hittats vid de analyserna är ftalater i mjuka plastleksaker och bly i elektriska leksaker. Vid kontroller av elektronik är det mest bly som har hittats. När Kemikalieinspektionen har låtit analysera kläder, skor och accessoarer har vi bland annat hittat nonylfenoletoxilater i kläder, ftalater i plastskor och bly, kadmium och nickel i smycken. Tester av byggvaror och inredning har visat att plastgolv innehåller ftalater och att utformningen av oljelampor inte uppfyller säkerhetskrav i lagstiftningen. När analyser har gjorts på sportartiklar har ftalater och kortkedjiga klorparaffiner hittats och i förpackningar av plast har kadmium hittats. Vid analyser av kemiska produkter har bland annat polycykliska aromatiska kolväten (PAH) hittats i tatueringfärger, hexaklorbensen i fyrverkerier och toluen i limmer.

Analysresultaten används främst i Kemikalieinspektionens tillsynsärenden. Erfarenheten från analyserna kan även användas då nya regler tas fram och för att sprida till andra länders tillsynsmyndigheter. Företag kan också ha nytta av informationen när de själva ska kontrollera sina produkter.

De varugrupper där flest analyser har gjorts är leksaker och andra varor för barn. En anledning till det är att det finns många regler för dessa varor att kontrollera och att Kemikalieinspektionen har prioriterat insatser som skyddar barn. Barn kommer dock i kontakt med många andra typer av produkter i hem och skolor och Kemikalieinspektionen kommer därför att fortsätta kontrollera och analysera olika typer av konsumentprodukter.

1 Introduction

1.1 Background

The Enforcement and Registries Department of the Swedish Chemicals Agency inspects companies which manufacture and import chemical products (pesticides are also included in the term), biotechnical organisms and articles that have been treated with or contain chemical substances. The inspections are performed pursuant to the Environmental Code and the Toys Act. The enforcement activity is part of the Swedish market surveillance which checks that articles on the consumer market are safe.

As parts of its enforcement activity, the Swedish Chemicals Agency has checked levels of chemical substances in articles and chemical products by conducting analyses. The chemical analyses have been performed partly with the Agency's own XRF instrument and partly using external accredited laboratories. The analyses have been performed under product-specific projects, and the number of analysed products has increased in recent years. The purpose of this report is to collate information and results from the analyses the Swedish Chemicals Agency has had performed in connection with supervision over the period 2008-2013 and to provide an overview of these.

1.2 Legislation

A brief introduction is provided below to the EU regulatory frameworks applicable to chemical products and articles. It is these regulatory frameworks that contain the limit values for different chemicals. A distinction is made in the legislation between *chemical products* and *articles*. Chemical products are individual chemical substances or mixtures of substances, usually in liquid form or as a powder. Examples are paints, adhesives and various types of pesticides. Articles are objects where the physical form, surface or design is of greater significance to function than the chemical content, examples being clothing, electronics and dolls.

A list of all the rules for which the Swedish Chemicals Agency undertakes enforcement can be found in Annex 3.

1.2.1 The REACH Regulation (EC) No 1907/2006

The REACH Regulation is the EU's largest regulatory framework for chemicals, and contains rules for individual substances, substances in mixtures and substances in articles.

The Regulation contains around sixty restrictions by which specific substances are restricted in different types of products and articles. These restrictions are contained in Annex XVII, and in most cases there are limit values indicating what levels of substances are prohibited. Examples of restrictions the Swedish Chemicals Agency has checked by conducting analyses are phthalates in plastic toys, toluene in adhesives, azo dyes in textiles and nickel in jewellery.

The REACH Regulation also contains requirements for information on certain substances in chemical products and articles.

- For chemical products there are rules on **safety data sheets** that are to provide users with safety information.
- There is a requirement for **articles** that the recipient of an article containing more than 0.1% by weight of a substance of very high concern (which is included in what is known as the **candidate list**) has to be informed that this is the case.

1.2.2 The RoHS Directive 2002/95/EC and 2011/65/EU

The RoHS Directive contains rules restricting the presence of certain substances in electrical and electronic products. The substances that are restricted are cadmium, lead, mercury, hexavalent chromium and the two groups of brominated flame retardants polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs). The limit values are 0.1% by weight for all the substances except cadmium, where the value is 0.01% by weight. The RoHS Directive 2011/65/EU has replaced the previous RoHS Directive (2002/95/EC) and entered into force in 2013. The rules in RoHS (old and new) apply to electrical and electronic equipment placed on the market on or after 1 July 2006.

1.2.3 The Toys Directive (2009/48/EC)

The EU directive on the safety of toys contains several requirements relating to the chemical content of toys. Among other things there are limit values regarding how much of certain metals are allowed to leach out, restrictions on the content of CMR substances (substances that may cause cancer, damage genetic material or harm the ability to reproduce) and fragrances. An example of a CMR substance that may be present in toys is the phthalate diisobutyl phthalate (DIBP). There are also requirements in the Directive that toys must not catch fire too easily.

1.2.4 The POPs Regulation (EC) No 850/2004

This regulation prohibits a number of persistent organic pollutants (POPs). The prohibitions apply to pure substances, substances in mixtures and substances in articles. In most cases there are no limit values but very low levels of unintentional trace pollutants are not prohibited. Examples of substances that are restricted are hexachlorobenzene (HCB), which may be present in fireworks, and short-chain chloroparaffins (SCCP), which are present for instance in plastified plastic.

1.2.5 The Biocides Directive 98/8/EC and the Biocides Regulation (EU) No 528/2012

The Biocides Directive regulates what requirements biocidal products must fulfil to be allowed to be placed on the market. The Biocides Directive has been replaced by the Biocides Regulation with effect from 1 September 2013. When the analyses described in this report were conducted the old Biocides Directive 98/8/EC was applicable. Biocidal products are pesticides with the properties that they kill living organisms or render them harmless. Examples of common biocidal products are rat poisons, wood preservatives and disinfectants.

1.2.6 The Product Safety Directive 2001/95/EC

The Product Safety Directive is a framework for product safety in EU legislation and contains general rules for the safety of consumer products. The Directive does not contain any direct prohibitions or limit values, but it is possible to take decisions under the Directive on specific restrictions. The Directive can also be used in enforcement when chemical risks with consumer products not regulated in other legislation are identified.

1.2.7 The Packaging Directive 94/62/EC

There are rules in the EU on collection and restrictions for chemical substances in packaging and packaging waste. Lead, cadmium, mercury and hexavalent chromium are substances that are restricted in packaging.

1.2.8 Swedish special rules

There are a few Swedish special rules that restrict the presence of chemical substances in chemical products and articles. Examples of these are the prohibition of mercury and the rule on how much formaldehyde may be released by wood-based boards. The rules are contained in the *Chemical Products (Handling, Import and Export Prohibitions) Ordinance (1998:944)* and in Swedish Chemicals Agency Regulations KIFS 2008:2.

1.2.9 Units in the legislation

Different units are used in different legislation to measure how much of a substance is present in a chemical product or article or how much is released from materials. The most common unit is per cent by weight, which measures how many per cent of the weight of the material is made up of the substance. This level can be measured in the units mg/kg or ppm (parts per million). 1 mg/kg or ppm is equivalent to 0.0001 per cent by weight.

The level of a substance with regard to coated materials is measured per unit of surface area, for example $\mu\text{g}/\text{m}^2$. The limit value for some substances in certain legislation is based on how much may be released from the material. This can be measured for example in $\mu\text{g}/\text{cm}^2/\text{week}$ or mg/m^3 .

2 Analyses

KemI has had several enforcement projects every year since 2008 in which analyses of articles and chemical products have been conducted. Most projects have concerned articles, but chemical products have also been analysed. In some cases there are separate reports, see section 3.4 *Further information*. Note that analyses described here do not provide a representative picture of the market as a whole. The selection of products tested is made from an enforcement perspective. It is not a statistical sample, articles and products deemed more likely to have deficiencies instead being prioritised.

In the sections below the articles have been broken down into the groups of articles we have prioritised in our enforcement in relation to articles¹ and in the work on our action plan for a non-toxic everyday environment². A diagram showing the analytical results appears at the end of each section. The number of products not fulfilling the statutory requirements is indicated in red. Products where substances hazardous to health and the environment have been found but which are not prohibited are shown in green. This may, for example, be substances that lead to requirements for information or substances that are not prohibited despite hazardous properties and are therefore of interest when product safety is checked. In several cases these are substances for which restrictions have been introduced later.

¹ Report No 4/11 Strategi för effektiv tillsyn över kemikalier i varor (Strategy for effective inspection of chemicals in articles). (<http://www.kemi.se/Documents/Publikationer/Trycksaker/Rapporter/Rapport4-11-varutillsyn.pdf>)

² Handlingsplan för en giftfri vardag 2011-2014 – Skydda barnen bättre (Action plan for a non-toxic-free everyday environment 2011-2014 – Protect children better) (<http://www.kemi.se/Documents/Publikationer/Trycksaker/Handlingsplan-Giftfri-vardag.pdf>).

2.1 Toys and other articles for children

We have tested various types of toys:

- Soft plastic toys
- Electric toys
- Masquerade toys
- Chemical toys
- Toys made of textile, rigid plastic and wood
- Other childcare articles

We found:

- Soft plastic toys: phthalates and short-chain chloroparaffins
- Electric toys: lead, cadmium and brominated flame retardants
- Masquerade toys: phthalates, short-chain chloroparaffins and azo dyes
- Felt-tip pens: benzene, toluene and xylene
- Textile toys: azo dyes and lead (in a metal part)
- Childcare articles: phthalates

2.1.1 *Soft plastic toys*

The Swedish Chemicals Agency has had soft plastic toys analysed on several occasions.

In 2009, 19 **soft plastic toys** were analysed with regard to phthalates, which are restricted in the REACH Regulation (DEHP, DBP, BBP, DINP, DIDP, DNOP). In one of the toys the phthalate DEHP was found at the same level as the limit value in the legislation.

In 2011, 22 **bath toys** were analysed with regard to restricted phthalates. In three of these the phthalates DINP and DIDP were found at levels exceeding the limit value (0.1% by weight).

We also had 28 **soft plastic toys** analysed in 2011 with regard to six restricted phthalates and two phthalates included in the candidate list. In three of the toys the phthalates DEHP, DINP and DBP were found at levels exceeding the limit value (0.1% by weight).

In 2012 the Swedish Chemicals Agency visited markets and purchased eleven **soft plastic toys** for the analysis of phthalates. Two toys contained the phthalate DEHP at levels exceeding the limit value.

In a joint project with the Swedish Consumer Agency and the Swedish National Electrical Safety Board in 2012 and 2013 we analysed 102 soft plastic toys with regard to six restricted phthalates, the phthalate DIBP in the candidate list and short-chain chloroparaffins (SCCPs). Phthalates (principally DEHP, DINP, DIDP, DBP and DIBP) and short-chain chloroparaffins (SCCPs) were found in 29 toys.

2.1.2 *Electric toys*

Electric toys have been inspected under the RoHS Directive every year from 2009 to 2013. The analytical results are shown in the table below. The most common contravention was that the toys contained excessively high levels of lead, principally in soldered joints inside the toys.

Year	Number of analysed electric toys	Number of toys not meeting the requirements	Substance exceeding limit value
2009	29	11	Lead
2010	79	17	Lead
2011	76	22	Lead
2012	34	15	Lead, cadmium, PBDE
2013	38	14	Lead, cadmium, PBDE

Table 2. Analyses of electric toys.

2.1.3 Masquerade toys

22 **masquerade articles** (masks, vampire teeth and other accessories) for children were analysed at the time of Halloween in 2011. The Swedish Chemicals Agency's XRF instrument was used for the analyses. No external analyses were performed. No high levels of the hazardous metals looked for were found in this screening analysis.

In 2012 the Swedish Chemicals Agency had the combustibility of nine toys tested, primarily **dress-up clothes, masks and wigs**. All the toys met the requirements for combustibility contained in standard EN 71-2.

In a joint project with the Swedish Consumer Agency and the Swedish National Electrical Safety Board seven masquerade articles were analysed, including masquerade clothing consisting of textiles. In the analyses we searched for azo dyes in fabrics and phthalates and short-chain chloroparaffins (SCCPs) in plastic parts. Two of the articles contained phthalates (DEHP, DINP, DIDP) and short-chain chloroparaffins (SCCPs).

In 2013 the Swedish Chemicals Agency analysed 85 **masquerade clothing items** for children to see whether they contained phthalates (DEHP, DBP, BBP, DIDP, DINP, DNOP, DIBP), azo dyes, cadmium and lead. The results showed that seven of the garments contained excessively high levels of phthalates (DEHP, DINP and DIDP) and two contained too much azo dyes. In one case the limit for how much cadmium is allowed to migrate from toys was exceeded. In another masquerade article DEHP was found at a high level, but as it was not deemed to be a toy only an obligation to provide information applied.

2.1.4 Chemical toys

In 2009, 20 **felt-tip pens** for children were analysed to see whether they contained benzene, toluene and xylene. Benzene at levels exceeding the limit value was found in three of the felt-tip pens. Toluene and xylene were found in five felt-tip pens, but at low levels in all cases. There were no restrictions in the legislation for xylene and toluene.

In 2011 the Swedish Chemicals Agency had seven types of **toy slime** tested to see whether they contained phthalates, phenol, formaldehyde and boron. Only boron was encountered. The content of boron may indicate that the slime contains substances toxic to reproduction such as boric acid and tetraborates, but as there was no analytical method it was not possible to ascertain this.

In a joint project with the Swedish Consumer Agency and the Swedish National Electrical Safety Board in 2012 and 2013, 15 **crayons, colour pens, finger paints, watercolours and clays** were analysed to see whether they contained hazardous metals. None of the products contained substances at levels exceeding the limit values in the toy standard EN 71-3.

2.1.5 Textile toys

During a toys project in 2012-2013 21 **textile toys** were tested, including dolls' clothes, soft animals and fabric balls. The textiles were tested to see whether they contained azo dyes, which one product did. One textile toy had an associated metal tinkler that released more lead than the limit value.

2.1.6 Rigid plastic toys

In connection with a toys project in 2012 and 2013 eight **rigid plastic toys** were analysed to see whether they contained brominated flame retardants and metals. No substances were found at levels exceeding the limit values.

2.1.7 Wooden toys

In 2013 the Swedish Chemicals Agency analysed five **painted wooden toys** with regard to metals. The test showed that none of the toys leached metals at levels exceeding the limit values in the toys standard EN 71-3.

2.1.8 Childcare articles

In 2010 the Swedish Chemicals Agency had ten **prams** and eight **pram accessories** (soft lifts, hard lifts and sleep bags) analysed regarding migration of eight metals according to the toys standard EN 71-3, azo dyes, a number of brominated flame retardants, the perfluorinated substances PFOS and PFOA, the six restricted phthalates, formaldehyde, dimethyl fumarate and polycyclic aromatic hydrocarbons (PAHs). Only low levels of barium and formaldehyde were found in some samples in the analyses, but no levels exceeded the statutory limit values. There is no limit value in the legislation for some substances, but neither were the limit values that had been set within the project exceeded.

In 2012 the Swedish Chemicals Agency had eleven different **nappies** for children tested to see whether they contained tributyl tin (TBT) compounds, dibutyl tin (DBT) compounds and dioctyl tin (DOT) compounds. None of the substances searched for were detected in the analyses.

In 2012 the Swedish Chemicals Agency had twelve **child car seats** and two **textile coverings** for child car seats tested with regard to brominated flame retardants (PBB, PBDE, HBCDD), azo dyes, formaldehyde, perfluorinated substances (PFOS, PFOA), phthalates (DBP, BBP, DEHP, DNOP, DIDP, DINP), lead (migration according to EN 71:3) and organotin substances (DBT, DOT, TBT, TPhT). In one of the seats the phthalate DEHP was found at the same level as the statutory limit value. Low levels of the substance formaldehyde were found to be present in the upholstery of certain seats. Certain samples also contained low levels of azo dyes, the brominated flame retardant decaBDE, the phthalate DEHP, dibutyl tin (DBT) and lead.

In a joint project with the Swedish Consumer Agency and the Swedish National Electrical Safety Board in 2012-2013 nine childcare articles were checked, principally **teething rings, bibs and inflatable changing tables**. The substances checked were phthalates and short-chain chloroparaffins (SCCPs). In one changing table the phthalate DINP was found at a level above the limit value.

2.1.9 Overview of toys and other articles for children

Figure 1 and Figure 2 present an overview of how many of the different types of toys and childcare articles have been analysed. How many failed to meet the regulatory requirements is shown in red. The number of articles where the substances were found but there was no statutory limit value is shown in green. Note that the selection has been made to attain effective enforcement, not to survey the market. The result therefore does not reflect all articles on the market.

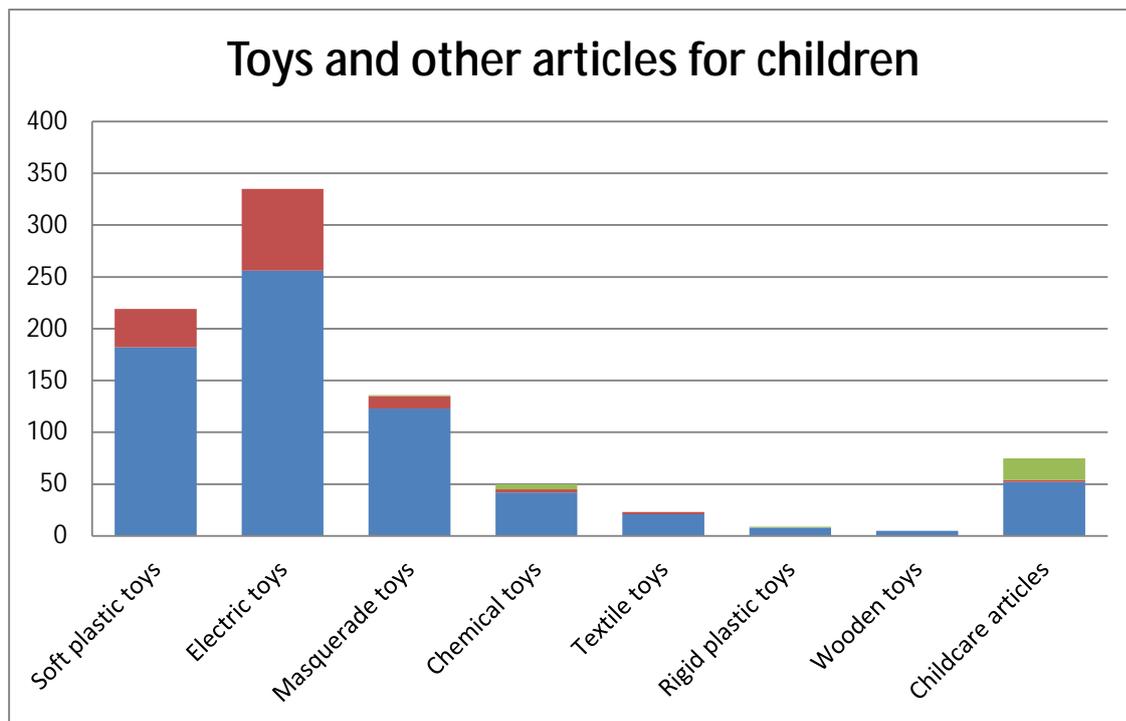


Figure 1. The diagram shows how many articles have been analysed out of different types of toys and childcare articles and how many failed to meet the regulatory requirements.

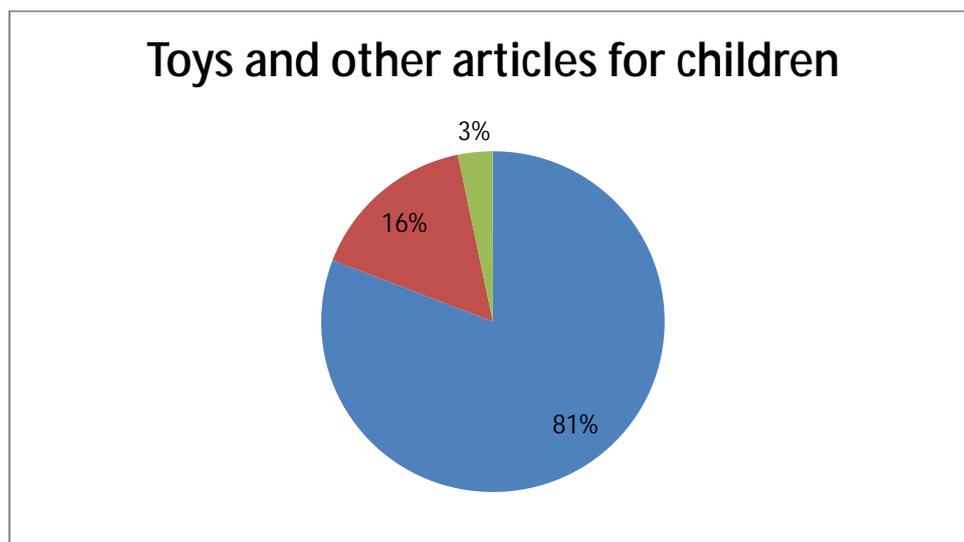


Figure 2. The proportion of toys and other articles for children that did not comply with the rules in inspections is shown in red.

2.2 Clothing, shoes and accessories

We have found:

- Nonylphenol ethoxylates, azo dyes and phthalates in clothing.
- Lead, cadmium and phthalates in plastic shoes.
- Nickel, cadmium and lead in jewellery.
- Hexavalent chromium in leather gloves.

2.2.1 Clothing

In 2009-2010 eighteen pairs of **jeans** were analysed to see whether the anti-mould agent dimethyl fumarate was present in the jeans. Dimethyl fumarate was not detected in any of the samples.

In 2013 110 **garments close to the skin** such as shawls, underwear, baby nappies with printing and full-cover bathing wear for children were analysed. In the analyses we looked for azo dyes, nonylphenol/ nonylphenoly ethoxylates and phthalates (DEHP, DBP, BBP, DINP, DIDP, DNOP, di(branched C6-C8)alkyl phthalates, di(branched and straight C7-C11) alkyl phthalates, DIBP, di(2-methoxyethyl)phthalate)). 48 garments contained nonylphenol ethoxylates, mostly at low levels. At present there is no ban on nonylphenol ethoxylates in clothing or any limit value for how much may be present in clothing. In two garments azo dyes were found that exceeded the limit values, and in two garments phthalates were found in excess of the limit value applicable to toys and childcare articles. However, there is no limit value for phthalates for clothing.

2.2.2 Shoes

In 2009 eight **shoes and shoe accessories** were analysed with regard to dimethyl fumarate, but the substance was not detected in any of the samples.

In 2012, 30 plastic shoes were analysed to see whether they contained cadmium, lead, organotin compounds (DBT, TBT, DOT, TPT) and phthalates (DIBP, DBP, BBP, DEHP). In one pair of shoes cadmium was found at a level exceeding the limit value in REACH. In nine shoes phthalates in the candidate list were found at levels above 0.1% by weight. These levels are permitted but lead to a duty to provide information according to REACH. Lead was also found in two shoes but at the time of the analysis lead was not restricted in legislation.

2.2.3 Jewellery and accessories

In 2008 the Swedish Chemicals Agency had 19 **items of jewellery, watches and clasps** analysed to see how much nickel they released. The result showed that two of the samples exceeded the permitted levels for how much nickel may be released.

In 2010, 31 pairs of leather gloves (working gloves and ordinary gloves) were analysed with regard to hexavalent chromium. Hexavalent chromium was detected in twelve of the gloves at levels between 3 and 52 ppm. Nine of these were working gloves. The limit value for working gloves is 3 ppm according to the European standard EN 420. Hexavalent chromium is not restricted for ordinary gloves.

In 2010, 50 items of **jewellery** were analysed with regard to nickel and lead. In 13 items of jewellery lead was found at levels that were higher than 0.1% by weight. The analyses were only performed with the Swedish Chemicals Agency's XRF instrument. At that time there was

no statutory limit value for lead in jewellery. A restriction on lead in jewellery was introduced in 2013.

In 2012, 29 items of **jewellery** from markets were analysed to see whether they contained nickel, lead and cadmium. Three items of jewellery exceeded the limit value for nickel and four items exceeded the limit value for cadmium. Twelve items of jewellery contained lead in excess of the future limit value of 0.05% by weight which was introduced in 2013, but the restriction had not yet come into force when the analyses were conducted.

In a project focused on toys in 2012 and 2013 three **children's jewellery items** were checked with regard to nickel, lead and cadmium. The level was high in one ring, however there was no limit value for this at the time of the inspection.

2.2.4 Overview of analyses of clothing, shoes and accessories

Figure 3 and Figure 4 present an overview of how many articles have been analysed and how many failed to meet the regulatory requirements (red). The number of articles where the substances were found but there was no statutory limit value is shown in green. Note that the selection has been made to attain effective enforcement, not to survey the market. The result therefore does not reflect all articles on the market.

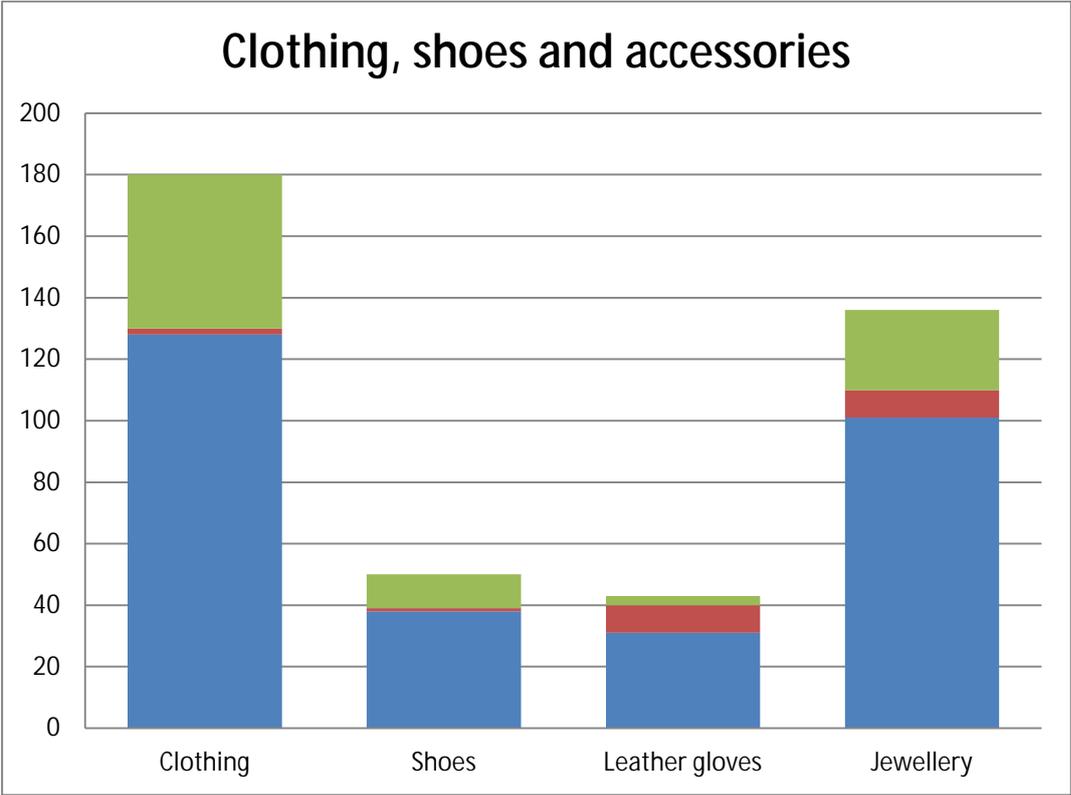


Figure 3. The diagram shows how many different articles in the group of articles have been analysed and how many failed to meet the statutory requirements.

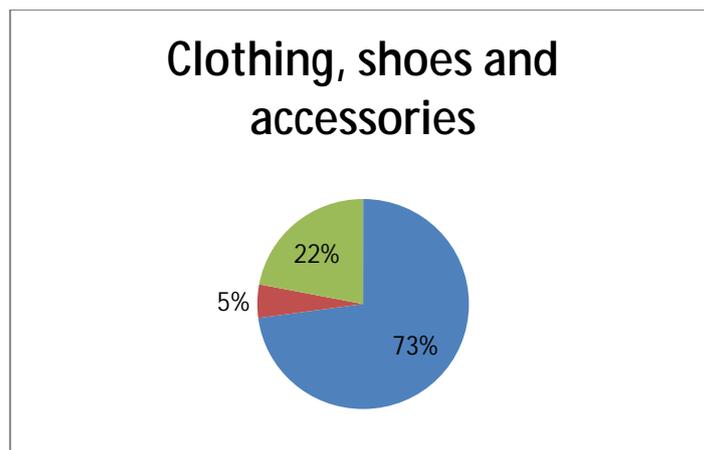


Figure 4. The proportion of clothing, shoes and accessories that did not comply with the rules in inspections is shown in red.

2.3 Electronics

- The Swedish Chemicals Agency has had home electronic products, headsets and electric haircare products tested.

We have found:

- Lead and PBDE in home electronics.
- Lead in electric haircare products.

2.3.1 Home electronic products

Various types of **home electronic products** were analysed between 2008 and 2013. A total of 327 articles were tested, some examples being lighting equipment, heating fans and radios. The majority of these products were obtained by the Swedish Chemicals Agency from the Swedish National Electrical Safety Board where the products have been tested with regard to electrical safety. The chemical analyses have been done to check lead, mercury, cadmium, hexavalent chromium and the brominated flame retardants PBDE and PBB. These are substances restricted under the RoHS Directive. The limit value for lead has been exceeded in 48 products. The level of PBB/PBDE has been exceeded in four products.

Year	Number of analysed home electronic products	Proportion of home electronic products not meeting the substance requirements	Substance exceeding limit value
2008	69	13	Lead
2009	12	1	Lead
2010	50	10	Lead
2011	62	10	Lead, PBDE
2012	63	12	Lead, PBDE
2013	71	6	Lead

Table 5 Analyses of home electronic products.

2.3.2 Headsets

In 2011 KemI tested eight headsets with metal parts (of the "in-ear" type) using the Apoteket nickel test. In all cases the test failed to produce a deflection, which indicates that the limit value for how much nickel may be released was not exceeded.

2.3.3 Hair dryers and tongs

A target analysis project was conducted in 2013 with inspection of **hair dryers and hair tongs**. 38 products were analysed, and two of these contained lead at levels exceeding the limit value in the RoHS Directive.

In addition to these products electric toys have also been analysed on several occasions, as described above in section 2.1.2 Electric toys.

2.3.4 Overview of electronics

Figure 5 and Figure 6 below present an overview of how many articles in the article group of electronics have been analysed and how many failed to meet the regulatory requirements (red). The number of articles where the substances were found but there was no statutory limit value is shown in green. Note that the selection has been made to attain effective enforcement, not to survey the market. The result therefore does not reflect all articles on the market.

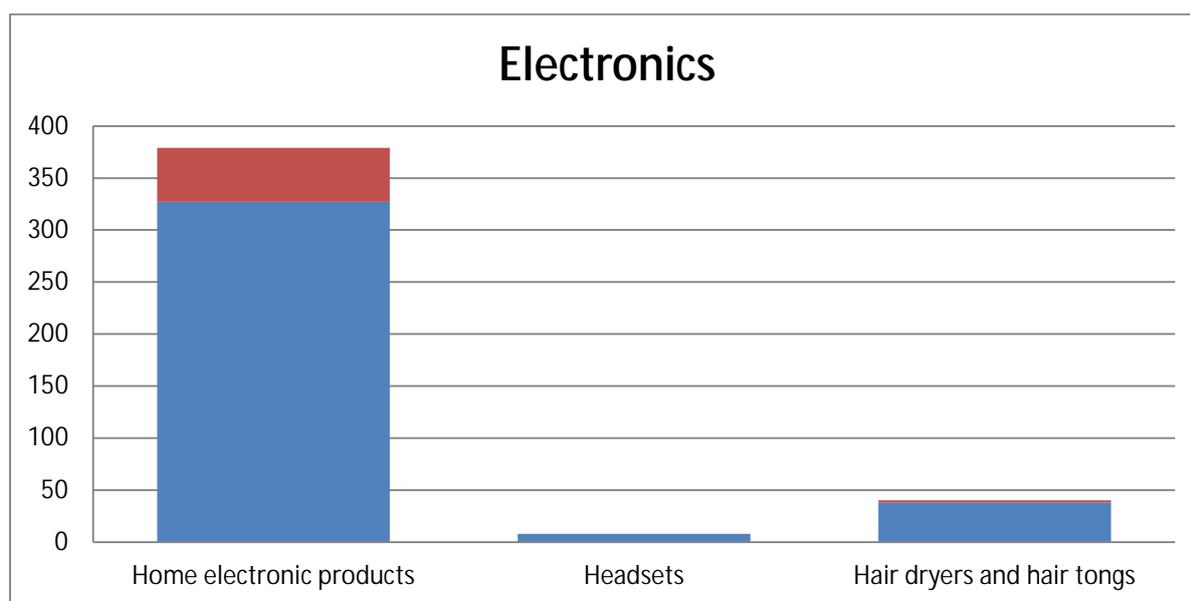


Figure 5. The diagram shows how many articles in the group of articles of electronics have been analysed and how many did not meet the statutory requirements.

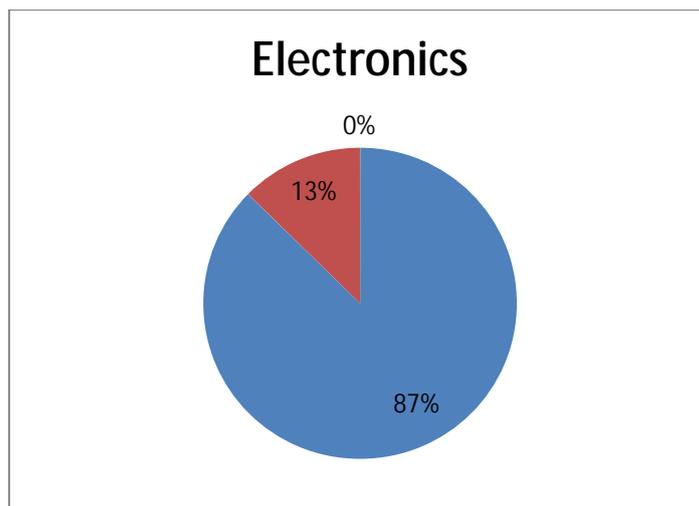


Figure 6. The proportion of electronics that did not comply with the rules in inspections is shown in red.

2.4 Furnishings and building materials

- The Swedish Chemicals Agency has had plastic flooring, textile carpets, furniture textiles, beanbags and oil lamps tested.

We found:

- Phthalates and short-chain chloroparaffins in plastic flooring.
- PBDE, phthalates and nonylphenol ethoxylates in furniture upholstery.
- The brominated flame retardant HBCDD in the filling of beanbags.
- Oil lamps have been tested and do not fulfil safety requirements regarding design.

2.4.1 Flooring and carpets

In 2012 the Swedish Chemicals Agency conducted analyses of 44 types of **plastic flooring** and **textile carpets**. The analyses were conducted to see whether they contain phthalates, lead, cadmium, brominated flame retardants (PBB, PBDE, HBCDD), organotin substances, short-chain chloroparaffins (SCCPs) and the perfluorinated substances PFOS and PFOA. In nine samples phthalates included in the candidate list were found at levels above 0.1% by weight. In three samples the phthalates DINP and DIDP were also found. Short-chain chloroparaffins were found in our flooring product. Low levels of PFOS and PFOA were also indicated, but the results were uncertain. No flooring or carpet contained substances that were restricted at levels exceeding the statutory limit values.

2.4.2 Furniture

In 2013 we had 74 samples from **upholstered furniture** and **beanbags** analysed with regard to azo dyes, nonylphenol ethoxylate/nonylphenol, brominated flame retardants (HBCDD, PBB, pentaBDE, octaBDE, decaBDE), perfluorinated substances (PFOS/PFOA), dimethyl fumarate and phthalates (DEHP, DBP, BBP, DINP, DIDP, DNOP, di(branched C6-C8)alkyl phthalates, di(branched and straight C7-C11)alkyl phthalates, DIBP, di(2-methoxyethyl)phthalate)). The textiles were textile and imitation leather upholstery for sofas, armchairs and chairs as well as coverings and filling for beanbags. In three samples substances from the candidate list were found at levels above 0.1% by weight. These

substances were the phthalates DBP (0.17% by weight) and the brominated flame retardants HBCDD (0.37% by weight) and decaBDE (23% by weight). Nine samples contained low levels of nonylphenol ethoxylates that are not included in the candidate list (DIDP and DINP). None of the samples contained restricted substances at levels exceeding the statutory limit values.

2.4.3 Oil lamps

In 2013 the Swedish Chemicals Agency had eleven **oil lamps** tested to check whether they meet the safety requirements for design required in accordance with standard EN 14059. None of the eleven oil lamps fully met the requirements in the standard.

2.4.4 Overview of furnishings and building materials

Figure 7 and Figure 8 below present an overview of how many articles in the article group have been analysed and how many failed to meet the regulatory requirements (red). The number of articles where the substances were found but there was no statutory limit value is shown in green. Note that the selection has been made to attain effective enforcement, not to survey the market. The result therefore does not reflect all articles on the market.

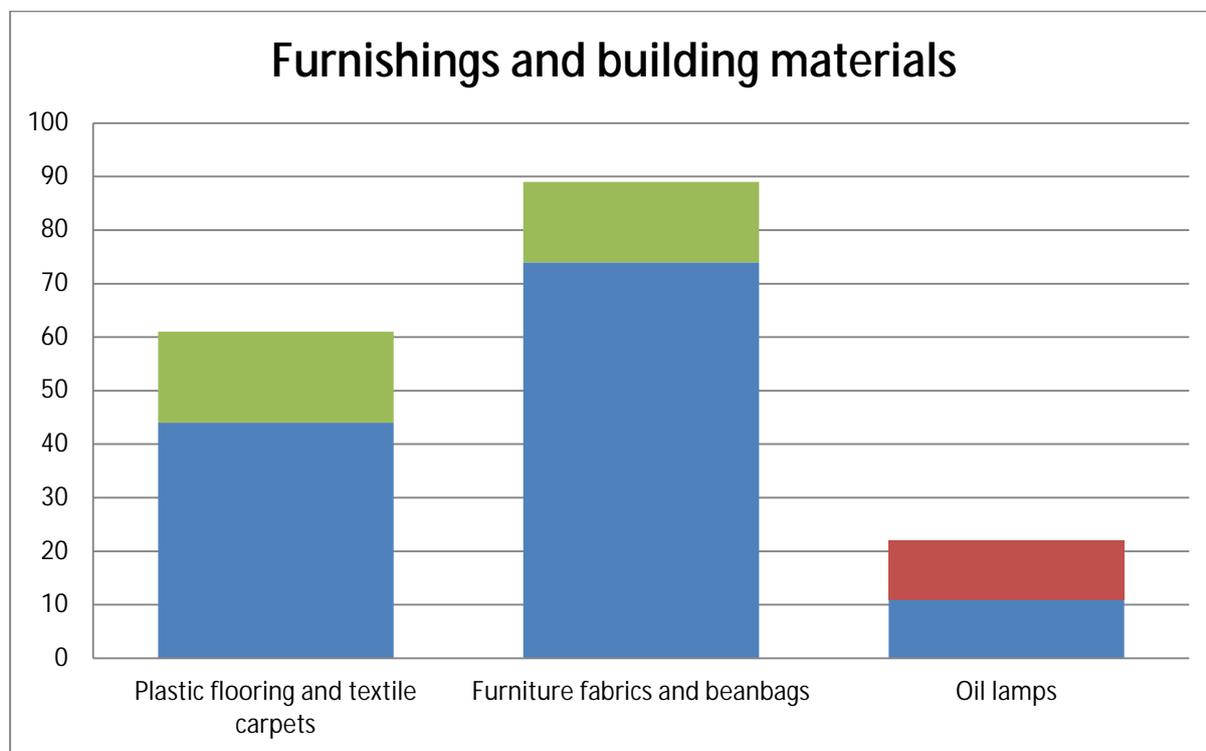


Figure 7. The diagram shows how many articles in the group of articles have been analysed and how many failed to meet the statutory requirements.

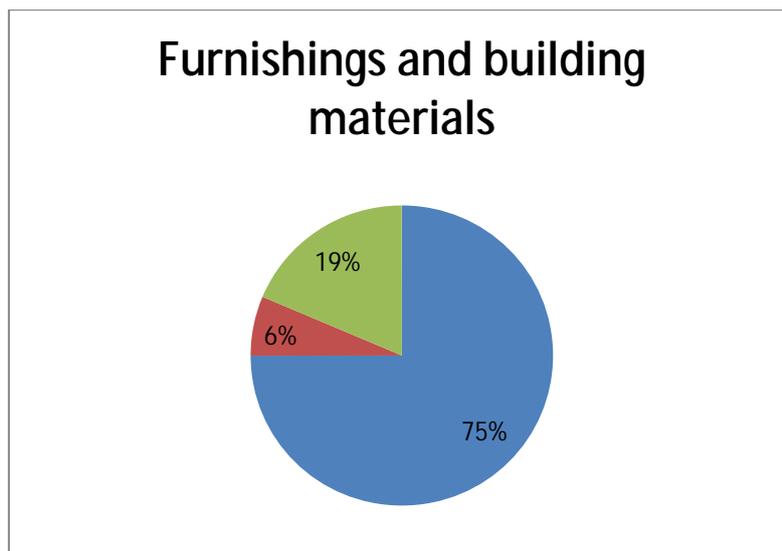


Figure 8. The proportion of furnishing articles that did not comply with the rules in inspections is shown in red.

2.5 Other articles

- The Swedish Chemicals Agency has had various plastic articles, sports articles and packaging tested.

We found:

- Phthalates and short-chain chloroparaffins in plastic articles.
- Phthalates and short-chain chloroparaffins in sports articles.
- Cadmium in plastic packaging of soft PVC plastic.

2.5.1 Various plastic articles

On two occasions (in 2010 and 2011-2012) the Swedish Chemicals Agency has had **miscellaneous articles** analysed with regard to substances included in the candidate list. The focus in these projects has been on certain types of material more than on a product type. The articles analysed were principally made of plastified **PVC plastic or other soft plastic**. Examples of articles analysed are handles of tools, cycle accessories, plastic covers of dumbbells, plastic shoes and accessories for cars. A total of 64 articles were analysed. In 33 of these substances from the candidate list were found at levels above 0.1% by weight. The substances that occurred most were the phthalates DEHP, DBP and DIBP, as well as short-chain chloroparaffins. These substances are not prohibited in articles of that kind but are subject to a duty of information regarding substances of very high concern.

2.5.2 Sports articles

In 2013 the Swedish Chemicals Agency had 52 **sports articles** analysed, for example exercise mats, dumbbells, boxing gloves and skipping ropes, to see whether they contain substances in the candidate list or metals. In twelve samples more than 0.1% by weight of substances included in the candidate list, for example the phthalate DEHP, which entails a duty to provide information, was found. In four samples short-chain chloroparaffins were found, which is prohibited under the POPs Regulation. In one sample deemed to be a toy the phthalates DINP and DIDP, which are restricted in toys, were found.

2.5.3 Packaging

In several cases the **packaging** the articles have been packed in has also been analysed to see whether they contain cadmium, lead and mercury. Of the 15 packaging items analysed, eight contained cadmium at levels exceeding the limit value in the Packaging Directive. These were transparent packaging of PVC plastic for toys.

2.5.4 Overview of other articles

Figure 9 and Figure 10 below present an overview of how many articles in the group of other articles have been analysed and how many failed to meet the regulatory requirements (red). The number of articles where the substances were found but there was no statutory limit value is shown in green. Note that the selection has been made to attain effective enforcement, not to survey the market. The result therefore does not reflect all articles on the market.

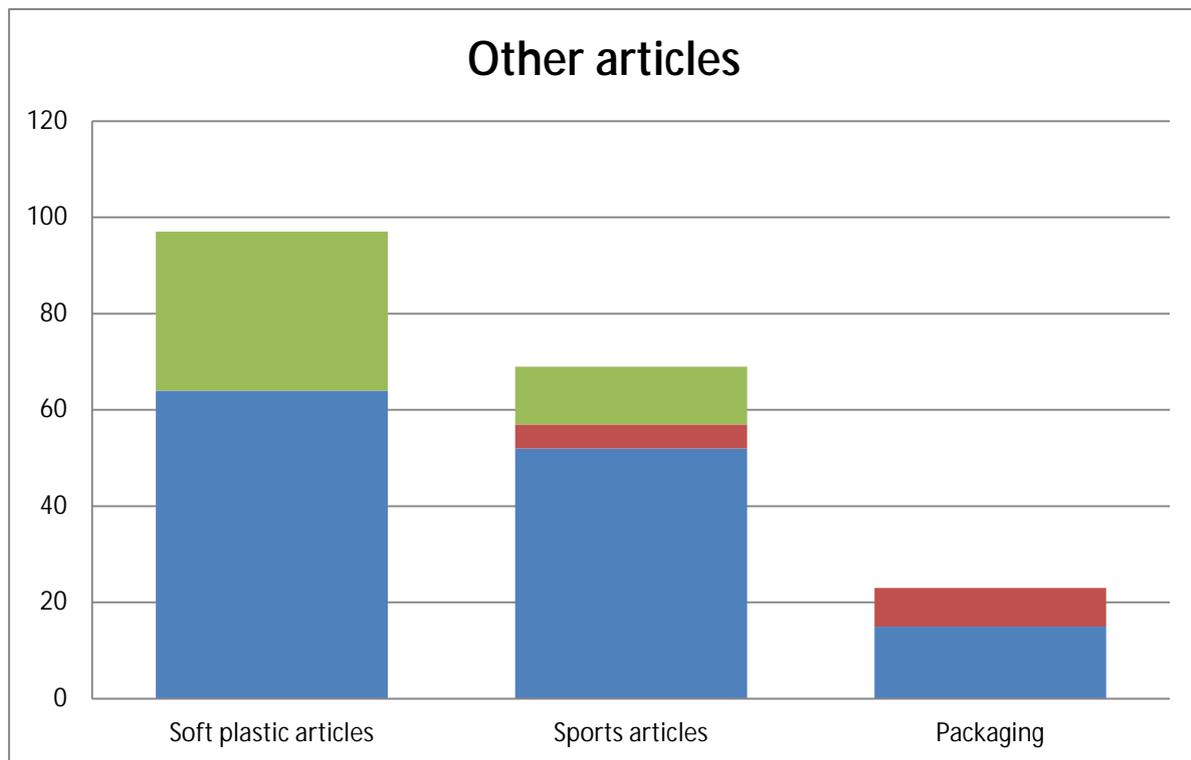


Figure 9. The diagram shows how many articles in the group of articles have been analysed and how many did not fulfil the statutory requirements.

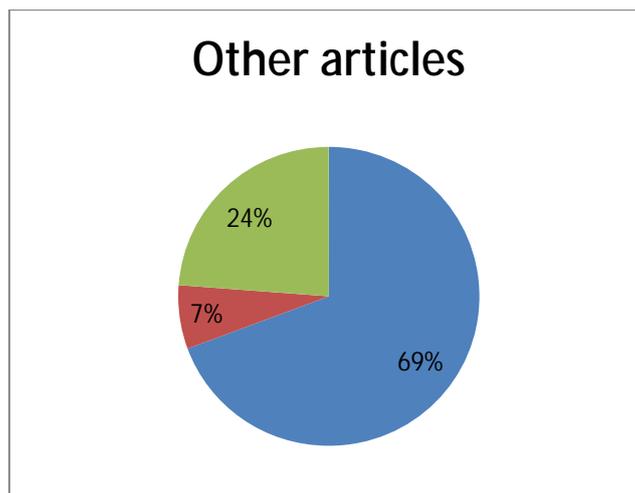


Figure 10. The proportion of other articles that did not comply with the rules in inspections is shown in red.

2.6 Chemical products

- The Swedish Chemicals Agency has had adhesives, spray paints, tattoo inks, fireworks, biocidal products, detergents and cleaning agents and cold packs tested.

We found:

- Toluene in adhesives and spray paints.
- Aromatic amines and a number of harmful metals in tattoo inks.
- Hexachlorobenzene (HCB), cadmium, lead, mercury and chromium in fireworks.
- Biocidal products where the level of active ingredient did not agree with the stated concentration.
- Aluminium nitrate at levels exceeding the limit value in cold packs. Cold packs are bags containing refrigerant which are used for example in sports injuries.

2.6.1 Adhesives and spray paints

In 2008-2009 **adhesives and spray paints** were checked with regard to toluene, xylene and benzene. A total of 54 products were analysed, and in eight of these the limit for toluene in the REACH Regulation was exceeded.

2.6.2 Tattoo inks

Tattoo inks have been analysed on two occasions. A total of 45 inks have been analysed to check the content of aromatic amines, certain carcinogenic substances, 14 metals and polycyclic aromatic hydrocarbons (PAHs). The result showed that eleven inks contained aromatic amines that should not be present in tattoo inks. The metals arsenic, barium, copper, tin, zinc and lead were present at levels exceeding recommended limit values in most inks. However, there were no limit values in legislation at the time of analysis. 37 of the analysed tattoo inks failed to comply with the recommended limit values.

2.6.3 Fireworks

The colour compositions in 20 **fireworks** have been analysed by the Swedish Chemicals Agency on two occasions with regard to hexachlorobenzene (HCB) and on one occasion to

check the levels of the metals lead, cadmium, chromium and mercury. HCB was found in eight fireworks at levels exceeding 50 mg/kg. In the eight fireworks analysed in 2010 lead, cadmium, chromium and mercury were also found, although not at particularly high levels. HCB is prohibited in the POPs Regulation.

2.6.4 Biocidal products

In 2011 the Swedish Chemicals Agency analysed the level of active substance in ten **biocidal products**. The analyses were done to check that the levels agreed with the concentration that had been stated by the manufacturer. The analysis showed for three products that the level of the active substance (bromadiolone) was lower than the stated level. This may possibly have been due to deficiencies in the analytical method, but is presented in this report as signifying that the statutory requirements are not met.

2.6.5 Detergents and cleaning products

In 2012, 20 different detergents and cleaning products were analysed to check whether the surfactants in the products were biodegradable. All the samples met the regulatory requirements for biodegradability.

2.6.6 Cold packs

In 2013 the Swedish Chemicals Agency had six **cold packs** (bags containing refrigerant used for example in sports injuries) analysed with regard to ammonium nitrate content. In three cases the limit value in the REACH Regulation was exceeded.

2.6.7 Overview of analyses of chemical products

Figure 11 and Figure 12 below present an overview of how many chemical products of different types have been analysed and how many failed to meet the regulatory requirements (red). The number of products where the substances were found but there was no limit value in the legislation is shown in green. Note that the selection has been made to attain effective enforcement, not to survey the market. The result therefore does not reflect all products on the market.

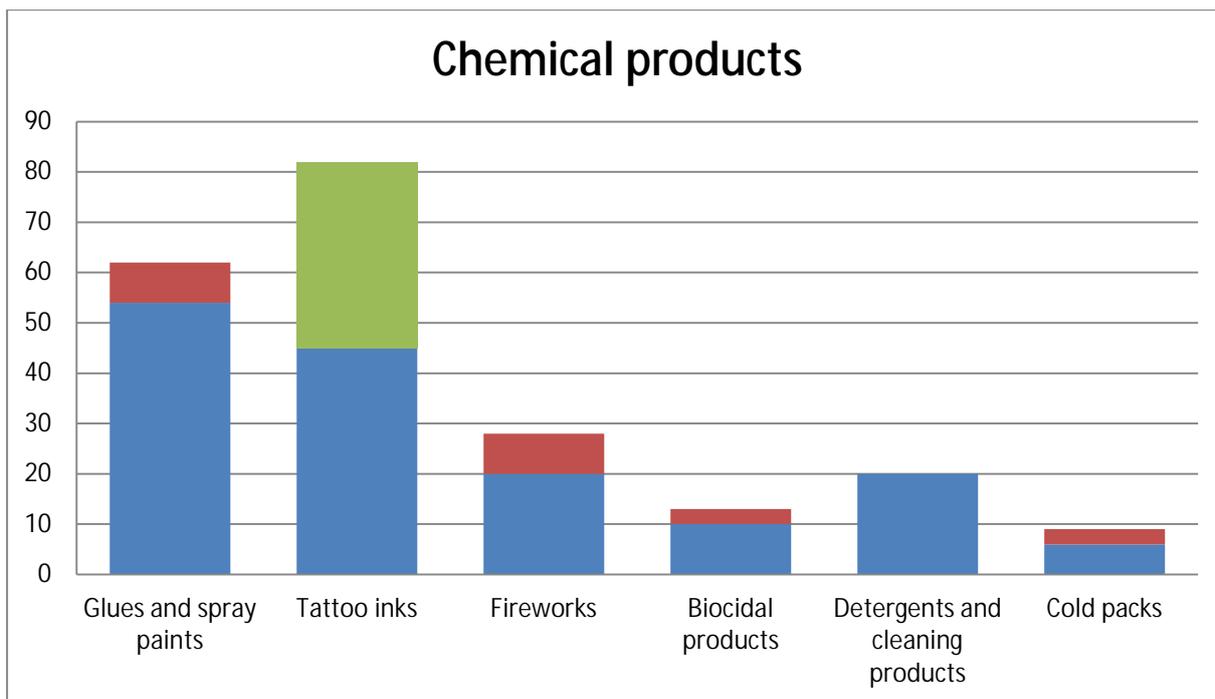


Figure 11. The proportion of chemical products that did not comply with the rules in inspections is shown in red.

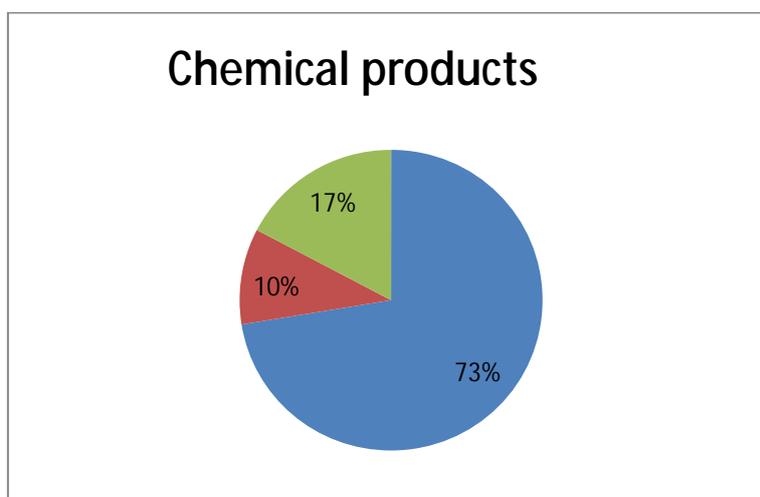


Figure 12. The diagram shows many different chemical products KemI has analysed and in how many cases they did not meet the statutory requirements.

3 Discussion

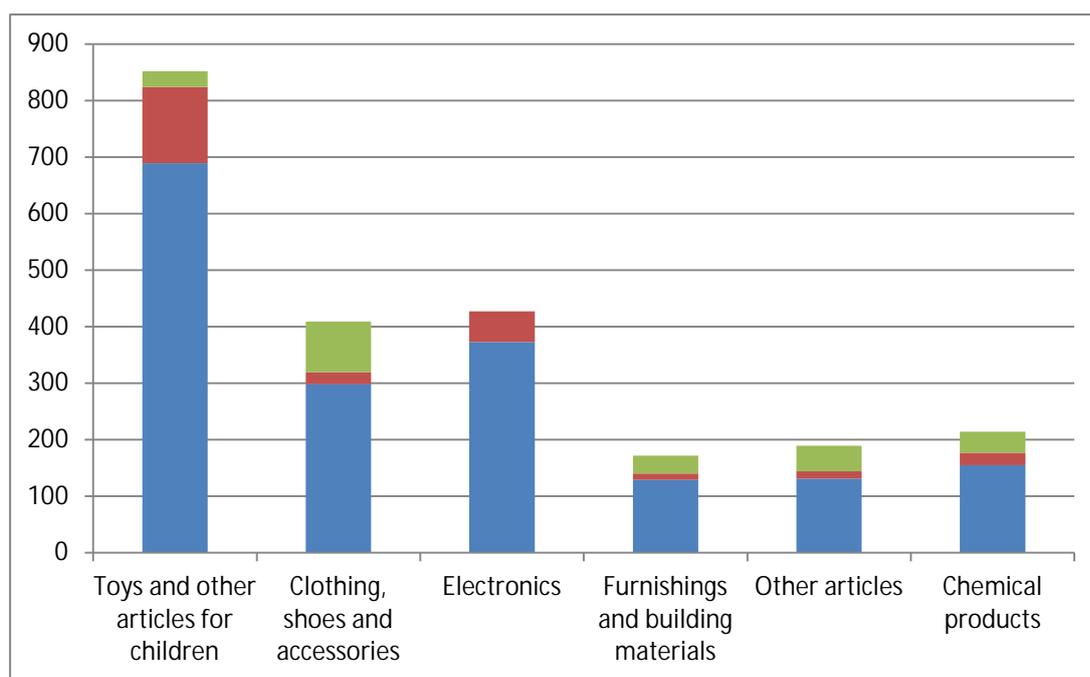
3.1 What do the analyses lead to?

The analyses conducted for the Swedish Chemicals Agency as part of its enforcement activity become enforcement cases. In some cases analyses of random samples are part of greater inspection work in which the company's self-inspection is also checked. In other cases analyses of random samples are the principal focus of the inspection.

When the analytical result is available the company the products come from is informed. In cases where the substances have been found at levels exceeding the statutory limit values the company have to give an account of what action they will take. In cases where a company does not voluntary withdraw the products from the market the Swedish Chemicals Agency may impose a ban on sale. In the case of contraventions of rules under the Environmental Code we are obliged to submit a notification to the environmental prosecutor. The prosecutor then assesses whether a preliminary investigation should be initiated. In some cases this leads to a company fine or indictment³.

3.2 Overview of the Swedish Chemicals Agency's analyses

The figure below shows how many products in the different categories have been analysed and how many of these have signified contraventions of rules (red). Products where substances hazardous to health and the environment have been found but which have not been prohibited are shown in green. These may, for example, be substances that lead to requirements for supply of information or substances that are not prohibited despite hazardous properties and are therefore of interest when product safety is checked. In several cases these are substances for which restrictions have been introduced later. Note that the selection has been made to attain effective enforcement, not to survey the market. The result therefore does not reflect all articles or chemical products on the market.



The groups of articles where most contraventions of rules have been found are toys and childcare articles and electronics. A likely reason for this is that these groups of articles are covered by more provisions than the other groups of articles and there is therefore a greater probability of the substances that are restricted being encountered. As well as the REACH Regulation, toys and electronics are covered by the Toys Directive and RoHS Directive respectively.

³ Further information about Swedish Chemicals Agency notifications for indictment can be found in Tillsyn (Enforcement) Memorandum 1/13.

In many cases substances that have not been prohibited but are regarded as being of very high concern are found, for example substances in the candidate list in the REACH Regulation. The company that supplies such an article is obliged to inform the recipient of the content, which is checked in enforcement. These substances are those which are in the process of being evaluated and which may be restricted in the future.

3.3 Future needs for analyses

The groups of articles for which we have conducted most analyses are toys and other articles for children. This is related to the action plan for a non-toxic everyday environment⁴ which the Swedish Chemicals Agency has drawn up on behalf of the Swedish Government. The action plan prioritises products that may expose children to chemical risks, and toys are a clear such group. Toys are additionally a group of articles covered by a relatively large number of rules. However, children come into contact with many more types of consumer products present in homes and schools, and other products have therefore been inspected. Another reason for prioritising consumer products is that consumers as a rule have less opportunity to stipulate requirements in purchasing, for example in comparison with what is purchased through public procurement.

The group of articles among those prioritised where the fewest analyses have been conducted is that of furnishings and building materials. These products are covered by relatively few rules, and this is a reason why few analyses have been performed. Many of these products are in people's environment for a long period of time, and may therefore have a great impact on the chemical environment. In 2013 and 2014 the Swedish Chemicals Agency has therefore made a particular commitment to inspecting such articles in a multi-year project focusing on material in the indoor environment. To date we have checked plastic flooring, textile carpets, furniture textiles and beanbags, and in 2014 testing is continuing with other types of interior textile.

Relatively few analyses of chemical products have been performed. One reason is that chemical products can be checked in other ways, for example by inspecting warning and safety information. Rules are lacking in most cases for articles, which leads to analyses becoming a very important enforcement tool. Conducting analyses of chemical products may, however, be a good complement for checks that warning and safety information is relevant and correct.

The Swedish Chemicals Agency will continue with the action plan for a non-toxic-free everyday environment and continue to inspect the groups of articles prioritised in this list. With regard to analyses, these too will continue to be conducted mostly on consumer products. The Swedish Chemicals Agency will continue to focus on furnishings and building materials in order to improve knowledge of chemicals in these articles. The Swedish Chemicals Agency intends to regularly publish the results of enforcement projects with analyses.

3.4 How can the results be used?

The analytical results are principally used in the Swedish Chemicals Agency's operational enforcement, in which we check that articles and products fulfil existing provisions. The analytical results can also be used to develop legislation. This can be done when rules are drawn up or revised by the Swedish Chemicals Agency and in EU contexts. In the REACH

⁴ <http://www.kemi.se/Documents/Publikationer/Trycksaker/Handlingsplan-Giftfri-vardag.pdf>

Forum⁵ working group on restrictions the EU Member States have to present their views on proposals for future rules on restriction. The Swedish Chemicals Agency's experience is that analyses and enforcement results make a great contribution to providing good feedback on new proposals for restrictions.

The analytical results can also be distributed to other stakeholders who have an interest in them. An example is companies needing to ensure that their own articles do not contain prohibited substances. The Swedish Chemicals Agency's analytical results can provide information on what substances may be found in different kinds of articles and materials. With this information the economic players can focus their resources on self-inspection of the articles, produces and provisions that are most relevant. Extensive analyses are relatively costly for a sole trader and support in focusing on the right areas is therefore valuable.

Other enforcement authorities may also benefit from receiving the information. This is done partly through Rapex⁶, where EU Member States report products that pose a risk. The Swedish Chemicals Agency can also distribute information on analytical results in its enforcement guidance to municipal enforcement authorities that may benefit from the information.

3.5 Further information

For further information on substances and rules, see www.kemi.se.

Reports from the Swedish Chemicals Agency's enforcement projects (available at <http://www.kemi.se/sv/Innehall/Publikationer/Tillsyn/>):

Enforcement 6/12 - Enforcement of the information duty in REACH, Inspection project 2011-2012 (in English)

Tillsyn 8/12 - Material i inomhusmiljön – Golv (Materials in the indoor environment – Flooring, in Swedish with summary in English)

Tillsyn 6/13 - Kemikalieinspektionens kontroll av leksaker 2012-2013 – i samverkan med Konsumentverket och Elsäkerhetsverket (The Swedish Chemicals Agency's inspection of toys 2012-2013 – in collaboration with the Swedish Consumer Agency and the Swedish National Electrical Safety Board, in Swedish with summary in English)

Tillsyn 1/14 - Material i inomhusmiljön 2 Möbeltextil (Materials in the indoor environment 2 – Furniture textiles, in Swedish with summary in English)

⁵ The Forum for Exchange of Information on Enforcement coordinates enforcement issues relating among other things to the REACH and CLP Regulations.

⁶ Rapex = Rapid Alert System for non-food dangerous products.

4 Annexes

4.1 Annex 1 – Glossary

Abbreviation	Explanation
XRF	X-Ray Fluorescence – an analytical method for screening analysis of elements on the surface of materials.
REACH	Registration, Evaluation, Authorisation and restriction of Chemicals – an EU-wide chemicals regulation.
RoHS	Restriction of the use of certain hazardous substances in electrical and electronic equipment – an EU-wide directive on hazardous substances in electronics.
CMR	Carcinogenic, Mutagenic, Toxic to reproduction – substances that cause cancer, harm genetic material and interfere with reproduction.
POPs	Persistent Organic Pollutants – collective name for organic substances that are long-lived in the environment and can cause harm. Also the name of an EU-wide regulation on such substances.
PVC	Polyvinyl chloride – a type of plastic that can be made soft with the addition of plasticiser.
Rapex	Rapid Alert System for non-food dangerous products – a system in which regulatory authorities in the EU report on dangerous products.

4.2 Annex 2 – Substances

Substance group	Examples of substances	Use
Phthalates	DEHP (di(2-hexyl ethyl) phthalate) DBP (dibutyl phthalate) BBP (benzyl butyl phthalate) DINP (diisononyl phthalate) DIDP (diisodecyl phthalate) DNOP (di(n-octyl) phthalate) DIBP (diisobutyl phthalate)	Used among other things as a plasticiser in plastic, particularly plastified polyvinyl chloride.
Polybrominated diphenyl ethers (PBDEs)	decaBDE (decabromodiphenyl ether) octaBDE (octabromodiphenyl ether) pentaBDE (pentabromodiphenyl ether)	Used as flame retardant, for instance in electronics and textiles.
Polybrominated biphenyls (PBBs)	octaBB	Used as flame retardant, for instance in electronics.
Perfluorinated substances	PFOS (perfluorooctane sulphonate) PFOA (perfluorooctanic acid)	Use among other things for impregnation of textiles and in fire-fighting foam.
Polyaromatic hydrocarbons (PAHs)	Anthracene	Unintentionally formed compounds which may be present for instance in rubber and vehicle exhausts.
Organotin compounds	TBT (tributyl tin) DBT (dibutyl tin) DOT (dioctyl tin) TPT (triphenyl tin)	Used among other things as a bactericidal agent in paint.
Chloroparaffins	Short-chain chloroparaffins (SCCPs)	Used as plasticiser and flame retardant for instance in polyvinyl plastic.
	Hexachromocyclododecane (HBCDD)	Flame retardant used for instance in polystyrene plastic.
	Dimethyl fumarate (DMFu)	Anti-mould agent used for instance in ship transportation of articles at risk of mould attack.
	Hexachlorobenzene	Used for instance as colour-intensifying additive in fireworks and as a pesticide.

4.3 Annex 3 – List of statutes

Below are listed the statutes that lie within the enforcement responsibility of the Swedish Chemicals Agency.

Act/Ordinance/Regulation/EU-regulation
Acts
Environmental code (1998:808)
Products Safety Act (2004:451)
Act (2011:579) on Toy Safety
Ordinances
Environmental Enforcement Ordinance (2011:13)
Ordinance (2007:19) on PCB, etc
Biocidal Products Ordinance (2000:338)
Plant Protection Ordinance (2006:1010)
Chemical Products (Handling, Import, and Export Prohibitions) Ordinance (1998:944)
Ordinance (2008:245) on chemical products and biotechnical organisms
Ordinance (2004:469) on Product Safety
Ordinance (2011:703) on Toy Safety
Ordinance (2012:861) on hazardous substances in electrical and electronic equipment
Regulations
Swedish Chemicals Agency's Classification and labelling regulations (KIFS 2005:7)
Swedish Chemicals Agency's Chemical products and biotechnical organisms regulations (KIFS 2008:2)
Swedish Chemicals Agency's Pesticides regulations (KIFS 2008:3)
EU-regulations
Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
Regulation (EC) No 1272/2008 of the European Parliament and of the Council 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 (CLP)
Regulation (EC) No 850/2004 of the European Parliament and of the Council on persistent organic pollutants and amending Directive 79/117/EEC (POPs)
Regulation (EC) No 648/2004 of the European Parliament and of the Council on detergents
Regulation (EC) No 1107/2009 of the European Parliament and of the Council concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC
Regulation (EU) No 528/2012 of the European Parliament and of the Council concerning the making available on the market and use of biocidal products
EU-directives/Implemented in Swedish legislation
Council Directive 1999/13/EC on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations

Directive 2004/42/CE of the European Parliament and of the Council on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products and amending Directive 1999/13/EC

The directives are implemented in Swedish legislation under the Environmental Code, in particular in the Swedish Chemicals Agency´s regulations (KIFS 2008:2).

Directive 2011/65/EU of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment (**RoHS 2**).

The directive is implemented in Swedish legislation with Ordinance (2012:861) on hazardous substances in electrical and electronic equipment.

Directive 1999/45/EC of the European Parliament and of the Council concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the **classification, packaging and labelling of dangerous preparations**

The directive is implemented in Swedish legislation under the Environmental Code and in the Swedish Chemicals Agency´s Classification and labelling regulations (KIFS 2005:7).

Council Directive 67/548/EEC on the approximation of laws, regulations and administrative provisions relating to the **classification, packaging and labelling of dangerous substances**

The directive is implemented in Swedish legislation under the Environmental Code and in the Swedish Chemicals Agency´s Classification and labelling regulations (KIFS 2005:7) and Swedish Chemicals Agency´s Chemical products and biotechnical organisms regulations (KIFS 2008:2).

Directive 2009/48/EC of the European Parliament and of the Council on the safety of **toys**

The directive is implemented in Swedish legislation under the Act (2011:579) on Toy Safety and the Ordinance (2011:703) on Toy Safety.



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