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Asbestos in cosmetic products

Study of asbestos in talc-containing cosmetic products

In order to prevent health risks, cosmetics must comply with European safety requirements. In 2018, the Netherlands Food and Consumer Product Safety Authority (NVWA) and the Human Environment and Transport Inspectorate (ILT) tested a number of talc-containing cosmetic products available on the Dutch market for the presence of asbestos fibres. The products involved were body powders, face powders, make-up powders, foundations and bronzers. This report contains the results of the market research.

Talc is a mineral that is mined and used in various (cosmetic) products. Asbestos is also a mineral that can be naturally found close to talc layers.

Because of this, there is a risk of asbestos being inadvertently extracted as well when mining talc. This constitutes unintentional contamination. In the Netherlands, the presence of asbestos in products is forbidden. Because of this, manufacturers are responsible for selecting and purifying talc to such an extent that no asbestos is present and cannot end up in the cosmetics either.

Background

Talc is used as a raw material in cosmetic products. In early March 2018, asbestos fibres were found in the talc in a few cosmetic products. As a result of this, the State Secretary of Infrastructure and Water (I&W) and the Minister of Health, Welfare and Sport (VWS) announced a study into the presence of asbestos in talc-containing cosmetics¹. The NVWA and ILT carried out this study in April and May 2018.

Risks

Asbestos fibres may occur as a natural contaminant in talc present in the soil. This is because both minerals talc and asbestos occur in the same soil layers in mines used for talc extraction. If contaminated talc is used as a raw material for cosmetics, asbestos fibres will unintentionally end up in these products. Depending on the type of asbestos, the concentration of asbestos fibres in the air and the period of exposure, public health could be put at risk. Especially exposure via the airways when using powdered products with asbestos fibres (inhalation) is a potential risk. Exposure to asbestos fibres through cosmetics cannot be compared to high exposure levels, like in the past among workers who used asbestos for their work, or residents who lived close to sources of high asbestos emissions. Such high concentrations may increase the risk of developing serious diseases such as cancer years later.

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¹ Letter to Parliament of 27 March 2018 on asbestos in cosmetics

Procedure

Products

In April and May 2018, the NVWA and ILT sampled and tested 296 cosmetic products from the following five categories:

- a) face powders,
- b) make-up powders (eyeshadow/blush),
- c) body powders for adults, children (babies) and for use on feet,
- d) bronzer powders,
- e) foundations (creams, grease paint).

These categories were chosen, because they are products that often contain talc. The make-up sets in particular often contain different colours, which resulted in subsamples.

Samples were taken from a total of 105 different cosmetic brands. The samples were mainly obtained from retail outlets (pharmacies, perfume stores, toy shops, department stores) and from a few online stores.



Face powder

Testing

The cosmetic products were initially tested by the Eurofins Sanitas Testing laboratory (hereinafter: Sanitas) for the presence of asbestos. The products in which asbestos was found with the method used by Sanitas (see under methods used by the laboratory) were further tested by TNO/Nomacon to determine the presence and number of respirable asbestos fibres. The risks of asbestos after inhalation are associated with the long, unbreakable asbestos fibres. For products with different colours, the colours in which Sanitas found asbestos were tested. The results of this study formed the basis for a risk assessment of the products by the National Institute for Public Health and Environmental Protection (RIVM) and the recommendation from the Office for Risk Assessment & Research (BuRO) of the

NVWA based on this. This is because the number of respirable asbestos fibres per kg of product is required to determine the health risk.

Analysis methods

1. NEN 5896 (en) '*Qualitative analysis of asbestos in materials, using polarised light microscopy (PLM)*'. This method is suitable for the identification of asbestos. A (visual) estimate of the asbestos levels is also made. Here asbestos is defined as the mineralogical fibre name for silicates that belong to the serpentine and amphibole minerals and have crystallised in what is called an asbestiform shape (length-diameter ratio $\geq 20:1$ and fibres longer than 5 μm and diameter $< 0.5 \mu\text{m}$). The measured levels can be classified in the following concentration categories: $< 0.1\%$ (m/m)= not detectable, 0.1–2%, 2–5%, 5–10%, 10–15%, 15–30%, 30–60% and $> 60\%$. This can also be used to determine the type of asbestos, including tremolite. One limitation of this method is that no distinction can be made between non-asbestiform and asbestiform fibres. If the PLM identification is difficult or impossible, the material must be analysed by means of scanning electron microscopy based on ISO 14966, in accordance with Annex C to NEN 5896.
2. NEN-ISO 14966 (en) *Ambient air - Determination of numerical concentration of inorganic fibrous particles - Scanning electron microscopy (SEM/XMA) method*. This is a scanning electron microscopy technique combined with X-ray microanalysis for detecting and identifying asbestos fibres. It can be used to determine the nominal asbestos fibre concentration (the number of fibres per gram of product) and the number of respirable asbestiform fibres per gram of product. The detection limit of this technique is 0.01%.
3. NEN-ISO 22262(-2) (en) *Air quality - Bulk materials - Part 2: Quantitative determination of asbestos by gravimetric and microscopical methods*. This standard describes how the samples should be pre-treated for analysis with SEM.

Methods used by the laboratories

1. Based on the composition, fat content and colours of the cosmetic products, Sanitas decided to choose the SEM method for the analysis (ISO 14966, Annex C to NEN 5896). All subsamples of the products with different colours were also tested. If limited quantities of fibres were identified using this method, Sanitas reported the asbestos content in the samples in the concentration range 0.1–2% in accordance with NEN 5896.

2. TNO/Nomaccon analysed the positive (sub)samples from the Sanitas tests and determined the number of respirable asbestiform fibres per kilogram in accordance with the ISO 14966 method. The samples were reprocessed in accordance with ISO 22262(-2), which allows the type of fibres in the products to be specified more precisely.

Statutory requirements

Asbestos is forbidden in cosmetic products pursuant to Article 2 of the Cosmetic Products (Commodities Act) Decree 2011, considering Article 14 and Annex II, no. 762 of the Cosmetic Products Regulation 1223/2009. It is possible, however, for traces of asbestos present as a contaminant in talc to end up as impurities in talc-containing products. Article 17 of the Regulation states the following about this: "The non-intended presence of a small quantity of a prohibited substance, stemming from impurities of natural or synthetic ingredients, the manufacturing process, storage, migration from packaging, which is technically unavoidable in good manufacturing practice, shall be permitted provided that such presence is in conformity with Article 3". Article 3 states that cosmetic products should be safe for human health when used under normal or reasonably foreseeable conditions of use. Asbestos is also regulated in the Asbestos Products Decree. This stipulates that it is forbidden to manufacture products with asbestos, import them into the Netherlands, have them available, provide them to a third party, apply or process them. The NVWA is responsible for supervising and enforcing the Cosmetic Products Regulation. The ILT is the competent authority for supervision and enforcement of the Products Decree. Due to the fact that the Cosmetic Products Regulation is more specific legislation than the Asbestos Products Decree, the NVWA has the lead in supervising cosmetic products.

Results

Talc in products

For the sampled products, it was first determined whether they contain talc (see introduction). Cosmetic products state a list of ingredients (INCI). After checking the list of ingredients for all the sampled products, 232 products turned out to contain talc (78%). For each product category these numbers are:

- a) 45 face powders; talc declared 34 times (75%).
- b) 114 make-up powders (eyeshadow/blush); talc declared 98 times (86%).
- c) 29 body powders for adults, children (babies) and feet; talc declared 28 times (96%).
- d) 28 bronzer powders; talc declared 24 times (86%).
- e) 80 foundations (creams, grease paint); talc declared 48 times (60%).

46 products do not state talc as an ingredient, so these will not contain talc. In addition, 18 products do not have the ingredients declaration, so it is unknown whether they contain talc.

The powders contain talc relatively often: 75 to 96%. The foundations clearly less often: 60%. However, the grease paint products often contain talc as well: approx. 70%.

Asbestos test results

Sanitas tested the 296 samples using the SEM method (in accordance with NEN 5896 and ISO 14966). 7 products were found to contain the tremolite mineral based on X-ray microanalysis (XMA). In addition, (a few) fibrous structures were observed using the SEM method. Tremolite is an indication for the possible presence of tremolite fibres, one of the forms in which asbestos occurs. Sanitas reported these results as asbestos in the concentration range 0.1–2% in accordance with NEN 5896. However, Sanitas was unable to clearly establish whether the tremolite fibres found are actually asbestiform fibres and should therefore be characterised as asbestos. Because of this, these results should be viewed as a screening of the products. This means that Sanitas reported tremolite fibres in 2.4% of the 296 products tested. The products involved were 3 grease paint (foundation) products of the same brand, 2 eyeshadows and 1 blusher (make-up) from 3 different brands, all produced in China, and 1 body powder (foot powder) from Switzerland. All products contain talc according to the INCI declaration. To obtain absolute certainty about the presence of respirable asbestos fibres and to carry out the risk assessment, the 7

products were then tested by TNO/Nomaccon^{1,2} (using ISO 14966 and ISO 22262).

No asbestos was found in 5 out of the 7 products. 2 products – a blusher and an eyeshadow – were found to contain asbestiform tremolite fibres in several colours (as presented in the packaging). The highest measured values per product are:

- a. blusher: 230 mg fibres/kg product
- b. eyeshadow: 40 mg fibres/kg product

Risk assessment³

Talc and asbestos are distinguishable due to their chemical composition, but also due to the difference in their crystalline structure. Talc usually consists of plates, but can also be fibrous. The various types of asbestos generally consist of fibres that are very difficult to break, but easily split in a longitudinal direction. A total of six types of asbestos are distinguished: chrysotile and the so-called amphiboles: amosite, crocidolite, anthophyllite, tremolite and actinolite. Not all contaminants in talc are fibrous: a mineral such as tremolite, which was found in a few products, can also have a structure that is not fibrous; this is called non-asbestiform tremolite. Only (electron) microscopic testing of samples after a specific pre-treatment, in combination with information about their chemical composition, can establish beyond doubt the nature and quantity of the contaminant.

Long, strong and thin asbestos fibres (length > 5 µm, with a length to thickness ratio > 5) cannot be properly removed from the lungs after inhalation, so (often decades later) they can have serious consequences, such as mesothelioma. That is why analyses focus specifically on respirable fibres, which can penetrate deep into the lungs. Skin contact with asbestos fibres does not lead to health issues. For asbestos, limit values for a negligible risk (NR) and a maximum acceptable risk (MAR) are used. The Health Council of the Netherlands has made recommendations for these limit values and the RIVM has based the risk assessment on these. The limit value for NR indicates that when exposed to an asbestos concentration of 3 fibres per m³ during one's lifetime the risk of death due to mesothelioma is 1 in 10⁶; the MAR level is a factor 100 higher.

For the 2 talc-containing cosmetic products (a blusher and an eyeshadow) in which asbestos fibres were found and quantified by TNO/Nomaccon, the RIVM concludes that the air concentration of fibres during use of these products also exceeds the MAR level for life-long exposure. The RIVM would like to point out here that the assumptions made, such as

use in a small room without ventilation, probably lead to overestimation of the actual exposure. The MAR value is also based on life-long exposure all day long; when taking into account a relatively short usage period of several minutes per day for a limited period of time, the estimated total exposure by these products is lower than that of life-long exposure to the MAR level. Based on the risk assessment performed, BuRO / RIVM concludes that the risk of asbestos-related diseases for users of the blusher and eyeshadow make-up products is probably limited. However, it is important to prevent further exposure as much as possible.

Corrective measures

The 7 products in which asbestos was reportedly found based on the Sanitas test results were initially withdrawn from the market by their manufacturers. The NVWA views the Sanitas test results as a screening method, following consultations with Sanitas and TNO/Nomaccon. This means that the TNO/Nomaccon test results are the conclusive ones. As a result of this, only the 2 products with respirable asbestos fibres were found to contain asbestos. The 2 asbestos-containing products were definitively withdrawn from the market. Finally, this also means that the 3 businesses whose products do not contain asbestos can resume the sale of their products.

Conclusion

The BuRO / RIVM risk assessment shows that the health risk of the two positively tested products is probably limited.

Sanitas reported that 7 products contained asbestos. A further analysis of these samples by TNO/Nomaccon revealed that no asbestiform fibres were found in 5 of these products. 2 out of the 7 products were found to contain asbestiform respirable tremolite fibres. Out of the total of 296 tested products, 2 contain asbestiform fibres, which is approx. 0.7%. This is approx. 0.9% of the products found to contain talc (232).

As it turned out that no asbestos was found in the vast majority of products, it can be concluded that it is certainly possible to produce asbestos-free (talc-containing) cosmetics.

² TNO report TR 2018/0067|Final report; Circular Economy & Environment; 22-06-2018

³ Recommendation for risks of asbestos in talc-containing cosmetic products; Office for Risk Assessment & Research; 03-07-2018

