

## Avoid "homemade" slime!

Slime, a sticky, elastic putty for kneading, is currently very popular with children and adolescents who find it entertaining and relaxing. This trend, which began in late 2016, has become a social phenomenon in France. Children knead slime for hours on end, both as a game and to relieve stress. There are many tutorials on the Internet on how to make your own. Numerous recipes are available that show how to vary the appearance and texture (by adding colour, glitter, etc.). There are also ready-to-use forms of slime, or "noise putty", on the market that have the same consistency, as well as slime preparation kits for children over 6 years of age that are sold in toy stores.

The principle of making slime is simple: it involves a cross-linking reaction of polyvinyl alcohol or starch with a cross-linking agent (hardener), usually boric acid or borax (sodium tetraborate decahydrate). Based on this principle, the online tutorials and recipes recommend the use of the following products, in very approximate proportions:

- As polymers: aqueous solutions of polyvinyl alcohol found in adhesives, mainly paper glues available to the general public. Transparent or white, they can be sold in large bottles (up to 5 kg). Starch is also suggested as a polymer for homemade slime;
- As a hardener: boron, in the form of boric acid or borax, incorporated directly as a powder or found in eyewash, contact lens solutions or laundry detergents;
- As dyes: coloured solutions or glitter gels from stationery stores, food colourings, textile dyes etc.;
- As a "bulking" agent: shaving foam, added to give the slime a lighter, more airy appearance (fluffy slime).

Slime preparation is therefore based on the misuse of chemicals and medicines. These products contain substances that are toxic to health, starting with boric acid. It is classified as a Category 1B reprotoxic substance under Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures. Effects on fertility, as well as on embryo-fetal development, have been observed for this substance after oral exposure in experimental studies.



Contact dermatitis due to handling slime (Source: Dr Schreiber)

Regarding the glues and dyes used in slime preparation, these products may contain preservatives whose normal use complies with Regulation (EU) No 528/2012 on biocidal products. These are mainly isothiazolinones, responsible for skin allergies.

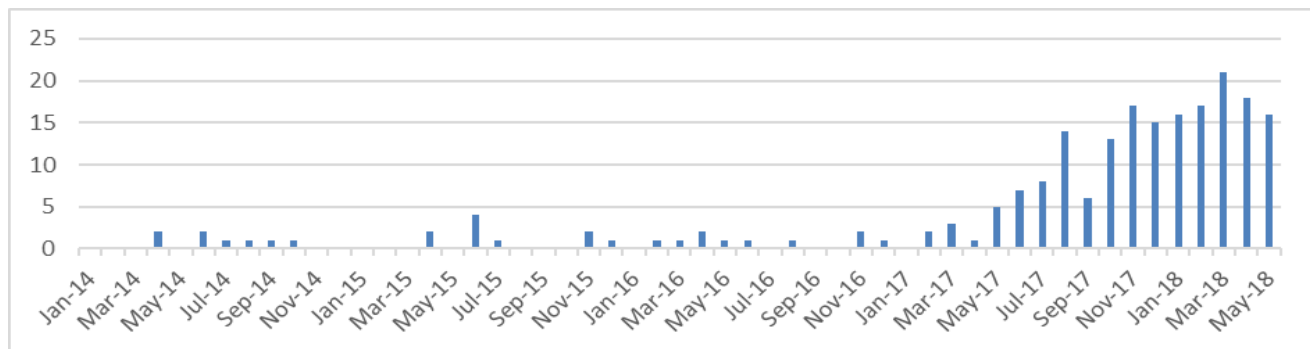
Lastly, in the particular case of shaving foam, according to Regulation (EC) No 1223/2009 on cosmetics, it is defined as a rinse-off product. It is not intended to stay in prolonged contact with the skin (as opposed to a leave-on product, such as cream).

Alerted to children and adolescents using boron in this context, in June 2017 the Directorate General of Health asked ANSES to analyse the toxicovigilance data associated with exposure to slime. The poison control centres (PCCs), the dermato-allergology vigilance network (Revidal-Gerda<sup>1</sup>) and the Allergos network<sup>2</sup> all worked to identify cases and characterise their symptoms.

The PCCs searched the National Database of Poisoning Cases (BNCI) for symptomatic or non-symptomatic cases recorded between 1 January 2014 and 15 May 2018 associated with "slime" or commercial slime products (slime preparation kits, ready-to-use slime or "noise putty") contained in the National Database on Products and Compositions (BNPC).

1. Dermato-allergology vigilance network (Revidal) and Dermato-allergology study and research group

2. Allergos is an association that has set up a network for sharing information on complex cases in allergology



**Figure 1:** Number of cases meeting the "slime" selection criteria registered in the PCC information system from 1 January 2014 to 15 May 2018

Two hundred and five cases were extracted for the study period, including 91 in 2017 and 87 from 1 January to 15 May 2018, corresponding mainly to girls with an average age of 8 years. These figures confirm that this is a new phenomenon, as PCC teleconsultations following slime exposure began gaining momentum in 2017, and then increased significantly in early 2018 (**Figure 1**).

Regarding the agents involved in this exposure, in 61 cases the victims had used commercially available slime preparation kits. For "homemade" preparations, in most cases it was very difficult to obtain recipes at the time of the teleconsultations, despite the parents being asked by the PCCs. This is because children often make their own slime, without adult supervision, mixing recipes found on the Internet. However, for the best documented cases, the most frequently reported products used were liquid laundry detergents and glues.

With children up to 15 years of age, exposure to slime was due to handling or was accidental (accidental mouthing in the case of toddlers, eye splashes). Two children were victims of malicious acts (cruel "jokes" at school). The use of gloves during preparation was noted in only one case, which is not surprising. Children handle the product without gloves because they are specifically seeking contact of their hands with the slime.

Most cases reported to PCCs involved oral/buccal exposure (163 cases), which was mainly asymptomatic (114 cases). As reported by patients during teleconsultations, the amounts ingested were low.

For the dermal route, 78% of the cases identified by PCCs were symptomatic (21 cases out of 27) and reported local lesions such as skin burns, redness and itching. In one case, lesions on the scalp and ears in addition to the hands were indicative of slime toxicity probably transferred by the hands.

Lastly, it should be noted that due to the volatility of many chemicals in the products used by children, inhalation exposure is also possible, causing headaches and nausea.

Data from Revidal-Gerda and the Allergos network confirm the recent increase in dermato-allergology consultations following the preparation or the handling of slime. The majority of patients were girls over 10 years of age. Patch tests performed on these patients often revealed an allergy to isothiazolinones, preservatives found in many of the ingredients used to make slime. Positive patch tests for lanolin were also observed: this allergenic substance is found in shaving foam, for example.

In light of these toxicovigilance data and the observed misuse of chemicals and medicines, ANSES, together with the Directorate General for Competition Policy, Consumer Affairs and Fraud Control (DGCCRF), is alerting consumers to the dangers of "homemade" preparations and repeated and prolonged handling of slime.

ANSES points out that regardless of the products containing them, boric acid and its derivatives must not be handled repeatedly by children. These compounds are toxic to fertility and embryo-foetal development, and must not be used for any purpose other than that for which they are marketed. This is particularly important since the amounts of boron used when preparing slime may be greater than in the recommended uses, and the recreational handling of slime is regular over long periods. In 2016, Health Canada recommended following boric acid-free slime recipes to minimise exposure to boron, which occurs naturally in food and water.

The repeated and prolonged handling of laundry detergent or glues can also lead to severe contact dermatitis, because all these products contain preservatives that are allergenic or irritant to the skin. They are not designed for prolonged, intense and repeated dermal contact.

Furthermore, the use of large containers of glue exposes consumers, especially children, to solvents, some of which can cause irritation of the eyes and airways, and are toxic to the central nervous system.

Lastly, not all the dyes used to prepare "homemade" slime are food grade or intended to come into contact with the skin.

ANSES also warns about certain ways in which slime is mishandled, such as the formation of giant slime bubbles with a straw, or "slime baths" in which slime is made in a bathtub: this practice exponentially increases the quantities of products used for its preparation and therefore the health risks.

Commercially available slime kits must comply with the Toy Safety Directive 2009/48/EC, which refers to specific testing standards. Thus, the NF EN 71-4 standard on experimental chemistry sets must be complied with. For this type of toy, ANSES and the DGCCRF remind users to follow the precautions for use: spatulas or devices for mixing the ingredients, included in these sets, enable skin contact with the chemicals to be limited.

Regarding retail sales of ready-made slime or "noise putty", these items must also comply with Directive 2009/48/EC and the NF EN 71-3 standard on the migration of certain elements. This standard ensures a boron migration limit in Category II toys (which include slime and "noise putty") of 300 mg/kg. In 2018, this regulatory framework led the DGCCRF to conduct an investigation to ensure the compliance of slime, "noise putty" and slime preparation kits sold in French stores. Six out of the 15 samples analysed had a boron content above the authorised limit and were withdrawn from the market. Given the popularity of slime among children and adolescents, the DGCCRF is continuing its inspections and market surveillance activities.

For recreational purposes, it is definitely preferable to use preparation kits or ready-to-use forms of slime or "noise putty", which avoid the misuse of chemicals and medicines. However, repeated and prolonged handling of this putty is not without health risks.

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#### TO FIND OUT MORE, VISIT:

ANSES. 2018. Exposition au Slime : données des centres antipoison et remontée d'alertes du Revidal-Gerda et du réseau Allergos [Slime exposure: data from poison control centres and reports of alerts from Revidal-Gerda and the Allergos network]

<https://www.anses.fr/fr/system/files/Toxicovigilance2018SA0262Ra.pdf>

Directive 2009/48/EC on the safety of toys. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:170:0001:0037:EN:PDF>

Standard NF EN 71-3. 2018. Toy safety. Part 3: Migration of certain elements.

Health Canada. 2016. Recalls and safety alerts. Health Canada advises Canadians to avoid home-made craft and pesticide recipes using boric acid <https://healthycanadians.gc.ca/recall-alert-rappel-avis/hc-sc/2016/59514a-eng.php>