Do-It-Yourself or *Don't do it yourself*: beware of certain recipes

© 123 RF

"Home-made" or Do-It-Yourself (DIY) means preparing a product at home rather than buying it from a retailer. When it comes to detergents, weedkillers or cosmetics, some preparations are dangerous and have led to calls to poison control centres. Poisoning can occur during both preparation and use of the DIY product. The most severe cases can cause bronchospasm or serious burns, and may have after-effects. The DIY recipes listed in this article should never be used.

WHAT IS DO-IT-YOURSELF?

"Home-made" or Do-It-Yourself (DIY) refers to the practice of preparing a product at home, to use immediately or to store for later, instead of buying it ready to use from a retailer. Consumers are attracted to this practice as it allows them to save money (by buying ingredients in bulk), preserve the environment (less household waste), control the product ingredients and learn new skills.

DIY most often concerns cleaning products for home and garden, as well as cosmetics. The recipes available on social media, websites and in books recommend buying the ingredients commercially or even sourcing them from the wild (such as ivy or ash for DIY laundry detergent).

However, some recipes pose risks, for several reasons:

- use of ingredients that are toxic to the person preparing and/or using the product,
- incorrect or imprecise dosages for certain ingredients (e.g. "add a pinch" or "add a spoonful of..."),
- uncertainties about the exact nature of the ingredients to be added (e.g. "polymer" or "soda"),
- mixtures of ingredients that can potentially cause dangerous chemical reactions,
- no information on what containers are unsuitable for prepared DIY products: for example, a bottle without a secure cap (whereas there would be one on a commercial product), use of old food packaging (water or soft drink bottle) or a container without a label making it impossible to determine its contents, which can lead to very serious accidents if accidentally ingested, particularly by children [1],
- storage problems and possible microbiological contamination.

CASES OF POISONING INVOLVING DIY PRODUCTS

"Home-made" products were responsible for 260 calls to poison control centres (PCCs) between 1 January 2016 and 17 November 2024. Almost half of these calls involved DIY products for the home or garden: detergents, surface cleaners, insecticides and weedkillers.

Other calls concerned DIY hygiene and cosmetics products[1] (soap, shampoo, topical cleanser).

The individuals calling the PCCs had been exposed through contact with raw materials, or with work surfaces and utensils contaminated during preparation, or through inhalation of vapours or gases emitted during manufacture. The majority of poisoning cases were minor, mostly involving signs of skin or eye irritation, as the individuals had typically prepared the recipes without wearing gloves or protective glasses.

However, more severe symptoms were also reported, such as bronchospasm when making weedkiller, and serious chemical burns to the skin or eyes when handling corrosive substances such as "soda" to make soap (see "What do we really mean by soda, bicarbonate, etc.?" below).

More than a third of the calls concerned accidents involving children aged between one and six years, reflecting parents concern when they had prepared DIY products with their children nearby or had let them help with the recipe.

EXAMPLES OF "DON'T DO IT YOURSELF"

Here is a non-exhaustive list of recipes that should never be made at home because of the serious health risks.

GARDEN OR HOME MAINTENANCE PRODUCTS

Weedkiller or cleaner based on a mixture of bleach and vinegar: suggested as a "home-made weedkiller" or to be applied successively to clean and descale the bathroom, mixing these two ingredients together causes the sudden release of toxic chlorine gas. This "chlorine shock" is intensified by heat (addition of hot water) and the mixing of concentrated products [2].

It irritates the respiratory tract, causing breathing difficulties, bronchospasm and possibly acute lung oedema. Patients often require hospitalisation, and can be left with potentially permanent after-effects such as reactive airway disease (asthma induced in a person who was not initially asthmatic).

In addition, vinegar is irritating to the eyes and skin at any concentration, and can cause serious burns at concentrations above 25%.

Ammonia- and bleach-based descaler: recommended as a bathroom cleaner and descaler, the use of ammonia (liquid) followed by bleach releases chloramines that are toxic to the lungs, causing the same symptoms as chlorine (see above) and also requiring emergency treatment. Successive application of these products in an unventilated or poorly ventilated room increases exposure to these chloramines and the risk of severe respiratory irritation. Ammonia is also corrosive to the skin and eyes, and can cause serious burns.

Ash- or ivy-based detergent: ash is used for its lime and ivy for the saponins contained in the leaf cuticle.

However, ash is corrosive to the skin and eyes, and saponins, handled when preparing "home-made" detergent, are surfactants causing contact dermatitis that can be severe depending on the concentration.

BAIT FOR PEST CONTROL

European regulations on biocides require the use of secure bait boxes for rodenticides containing anticoagulants. This ensures that users, children or pets never come into contact with the active substances. Recipes explaining how to make your own bait for pests (insects, mice), by incorporating an active substance such as alphachloralose in attractive foods such as condensed milk, bread, sugar granules or eggs, do not therefore comply with the regulations. Bait placed on the ground can be accidentally ingested by children or pets. This has already led to a number of deaths [3].

Moreover, some substances should not be handled by consumers because of their long-term toxicity, such as boric acid, which is toxic to fertility and embryo-foetal development[2].

SLIME

To make this elastic putty that can be kneaded ad infinitum, numerous tutorials on the internet suggest the misuse of products such as detergents, shaving foam and glues containing allergenic preservatives such as isothiazolinones. Preparation of home-made putty and repeated, prolonged handling can cause irritation, burns and sometimes severe allergies to the hands and nails.

ANSES warned about the risk to children posed by these home-made preparations back in 2018 [4].

In addition, some recipes recommend the use of eye drops containing boric acid at concentrations above therapeutic levels, despite this substance being toxic to fertility and embryo-foetal development, as mentioned above.

COSMETICS

Zinc oxide-based cosmetics: the maximum regulatory concentration of zinc oxide in ready-to-use cosmetics must not exceed 25%, a threshold that is not always adhered to in DIY recipes. In addition, its use in spray cosmetics is strictly prohibited in Europe under Regulation (EC) No 1223/2009, due to its pulmonary toxicity when the particles are at the micrometre scale. Uncertainties persist as to its toxicity in nano form.

False nail glues containing cyanoacrylates: some recipes recommend using a "cyanoacrylate base", an ingredient that may refer either to ethyl cyanoacrylate (or ethylacrylate), for which the quantities handled should be very limited because of its toxicity (skin, eye and respiratory

[1] Hand sanitiser gels and solutions were not taken into account because the occurrence of DIY accidents involving these products was limited to the period of the COVID-19 pandemic.
[2] Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures.

irritation, skin allergen), or to methyl cyanoacrylate (or methylacrylate), which triggers exothermic chemical reactions that can cause thermal burns if splashed directly on the skin.

Furthermore, whether the glue has been purchased from a retailer or is a DIY preparation, it must be handled with extreme care, as any splashes on fabric clothing, particularly cotton, cause a violent exothermic reaction that can result in third-degree burns to the skin under the fabric [5].

Soaps: some home-made soap recipes recommend following the saponification process, i.e. transforming a fat or lipid into soap using a strong base. The base used in cold saponification is sodium or potassium hydroxide, both of which are highly alkaline and intensely corrosive. They must therefore be handled with great care, using suitable protective equipment (gowns, gloves, glasses) and in a well-ventilated area, as they also give off dangerous vapours. Contact with the skin rapidly causes a potentially serious and deep chemical burn, while splashes in the eyes can cause serious injury, leading to blindness.

WHAT DO WE REALLY MEAN BY SODA, BICARBONATE, ETC.?

Some DIY recipes call for the use of "soda". This white crystalline powder actually covers a number of different chemicals with regulatory statuses ranging from classification as corrosive to skin to no classification at European level. However, the information on retail packaging about the nature of the "soda" is sometimes imprecise, which increases the risk of accidents.

Four substances are grouped together under the generic term "soda":

- Sodium hydroxide (NaOH), also known as caustic soda, lye or anhydrous soda, comes in the form of powder, microbeads, tablets or flakes. It is a strong base with a pH > 12, corrosive to the skin and eyes at concentrations above 5% and highly irritating at lower concentrations, which can cause serious accidents. Its corrosivity can be fatal after accidental ingestion. This substance is recommended for the preparation of "home-made" drain unblockers and solvents (e.g. for stripping wallpaper), and also as a saponifying agent (see above).
- Anhydrous sodium carbonate (Na_2CO_3), also known as calcined soda, soda crystals or soda ash, is a weak base with a pH of 11-12. It is highly irritating, especially to the eyes. It is recommended for making tablets for dishwashers and washing machines.
- Sodium carbonate peroxide ($2\ Na_2CO_3 \cdot 3\ H_2O_2$), also known as sodium percarbonate or percarbonate of soda, can be purchased in powder or microbead form. It is highly irritating to the eyes and to the digestive tract if ingested by mistake. It is used as a bleaching agent and disinfectant for equipment.
- Sodium hydrogen carbonate ($NaHCO_3$), also known as bicarbonate of soda or baking soda, with a pH of 8-9, does not have the same corrosive and irritant properties as the substances above. It is used as a baking powder and a whitening agent in the manufacture of mouthwashes, dental abrasives and household products.

CONCLUSION

Extreme caution is needed when preparing "home-made" everyday consumer products involving mixtures of chemicals, both during handling and use. Certain recipes must never be used, as they can cause serious poisoning with after-effects, and may even be fatal. Many specific accidents can occur during handling, with the risk of toxic substances being splashed or inhaled. Ingredients handled in their pure state can be more dangerous than when mixed in a recipe. Children may accidentally gain access to them while the product is being prepared.

Once a product has been prepared and packaged, a failure to label it, the misleading use of a food container or a container that is unsuitable for the product's chemical nature can all be responsible for serious accidents, particularly accidental ingestion by children.

Despite all the obvious benefits, do-it-yourself can also create health risks. Vigilance is needed when deciding between DIY and a ready-to-use manufactured product sold in a suitable container.

Alain Aymard (ANSES expert), Camille Paradis (Bordeaux PCC), Cécilia Solal (ANSES)

FIND OUT MORE

[1] ANSES. 2024. Transferring household products to unsuitable containers is a very poor practice responsible for serious accidents every year Vigil'Anses 22. https://vigilanses.anses.fr/sites/default/files/VigilAnses_N22_Decantingproducts.pdf

[2] ANSES. 2023. Never use a mixture of bleach and vinegar for weed control. Vigil'Anses 19. https://vigilanses.anses.fr/sites/default/files/VigilAnsesN19_June2023_Weedcontrol.pdf

[3] ANSES. 2021. Banned rat poison causing death and serious poisoning in children in France. Vigil'Anses 15. https://vigilanses.anses.fr/sites/default/files/VigilAnsesN15_November2021_Ratpoison.pdf

[4] ANSES. 2018. Avoid "home-made" slime! Vigil'Anses 6. https://vigilanses.anses.fr/sites/default/files/VigilAnsesN6_October2018_Slime.pdf

[5] ANSES. 2021. Nail glues: risk of severe thermal burns. Vigil'Anses 13. https://vigilanses.anses.fr/sites/default/files/VigilAnsesN13_March2021_Glue.pdf