

FAQ

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Repelling mosquitoes, ticks and flies: Are there any health risks associated with using repellents?

As the days get longer and the evenings warmer, it usually isn't long before the first mosquitoes appear. Repellents, such as insect repellent sprays, help to keep mosquitoes, ticks and other insects at bay and can thus protect against unpleasant bites and, consequently, certain diseases. They are usually applied to the skin, where they use chemical substances such as diethyltoluamide (DEET), icaridin and ethyl butylacetylaminopropionate (IR3535) to block or disrupt the insects' olfactory receptors, preventing them from following human odours (such as those in breath or sweat).

Repellents are classified as 'biocidal products' as they contain substances that can kill, render harmless or repel organisms. They must undergo an authorisation process before being placed on the market to ensure safety for humans and the environment. Repellents may be sold freely in shops or online.

If used incorrectly, certain substances in repellents can cause irritation to the eyes, skin and mucous membranes. The substance DEET is of particular concern in this regard. Products containing DEET or icaridin should not be used by children under the age of two.

Alternatives to synthetic substances are substances derived from plants. However, their effectiveness is described as weaker and less long-lasting than that of the synthetic substances mentioned above. In some cases, however, these substances have not yet been subject to an assessment by the regulatory authorities.

Below, the German Federal Institute for Risk Assessment (BfR) has compiled frequently asked questions and answers on repellents and their health risks.

What are repellents?

Repellents, with greater awareness as insect and tick repellents, are substances used to ward off pests. They are used to deter insects, ticks and other pests and to protect against annoying bites or stings. To ward off these pests, repellents block or disrupt the animals'

olfactory receptors, preventing them from following human odours, such as those found in sweat.

Repellents are often available as sprays, lotions, oils, gels or sticks.

How are repellents classified under the law?

Repellents are classified as so-called biocidal products of product type 19 (repellents) under [EU Regulation No 528/2012](#). These are products that deter insects, ticks and other pests using fragrances without killing them. Biocidal products must undergo an authorization procedure before being placed on the market to ensure safety for humans and the environment; however, they may currently remain on the market without being authorized for a transitional period, subject to certain conditions, if they were already on the market and had been notified before 14 May 2000.

Which biocides are commonly used in repellents?

There are various synthetic substances used in repellents. Among the substances with the most awareness are diethyltoluamide (DEET), icaridin and ethyl butylacetylaminopropionate (IR3535).

DEET is one of the most effective substances in repellents. Repellents containing DEET are recommended, for example, by various [tropical medicine institutes](#) and the [Federal Foreign Office](#) for travel to tropical regions where the prevalence of diseases such as dengue fever, malaria, Zika and yellow fever is high. The duration of effectiveness depends on the concentration in the product itself and can last for up to eight hours. Generally speaking, DEET is more effective against mosquitoes than against ticks.

Products containing DEET can irritate the mucous membranes at higher concentrations. If used incorrectly, the substance can have a toxic effect on the nervous system (neurotoxic) and should therefore not be applied over large areas or for prolonged periods.

Furthermore, DEET can damage plastic surfaces as the substance corrodes plastic (for example, sunglasses, mobile phones or clothing made from synthetic fibres).

Icaridin (hydroxyethyl isobutyl piperidine) is similar in effect to DEET, but is considered to be better tolerated. However, it may cause eye and skin irritation when used. Repellents containing Icaridin are suitable for children aged two and over. Icaridin has efficacy against mosquitoes and ticks with a high prevalence in Germany and Central Europe, but its effect generally lasts for a shorter period than that of DEET. Unlike DEET, Icaridin does not damage plastics.

As an alternative to DEET and icaridin, there is also **ethyl butylacetylaminopropionate** (IR3535 or EBAAP). Although this substance is similarly effective, its efficacy lasts shorter than that of the other two substances. Unlike DEET and icaridin, IR3535 is gentler on the skin and generally causes little irritation to the mucous membranes. The substance is also compatible with materials and does not, for example, damage plastics.

Are there also natural substances that act as repellents?

As well as synthetic substances, there are also substances derived from plants that are used as repellents.

However, such substances are generally less effective and do not last as long as synthetic ones, as they evaporate more quickly from the skin and therefore need to be reapplied regularly. Furthermore, there are reports that they can cause skin and mucous membrane irritation when exposed to sunlight. Due to transitional regulations, some of these substances have not yet undergone official assessment and authorization.

Do repellents pose any health risks?

When used correctly, repellents are generally well tolerated. However, if used incorrectly (too high a concentration, too frequent application, use over a prolonged period, or on children under two years of age), they may cause skin and mucous membrane irritation (redness, skin irritation or blistering), eye irritation if the product comes into contact with the eyes, respiratory problems or, in the case of products containing DEET, in rare cases, neurological effects such as dizziness or headaches.

What should you bear in mind when using these products on children?

Not all insect repellents are suitable for use on children.

Repellents containing diethyltoluamide (DEET) must not be used on children under two years of age. The reason for this is that the substance can cause skin and mucous membrane irritation in young children – for example, if the child puts their hands in their mouth – or lead to neurological effects.

A more suitable alternative for children aged one year and over is insect repellents containing ethylbutylacetylaminopropionate (IR3535), as this substance is gentler than DEET.

It is also important to ensure that repellents are never applied to wounds, irritated skin (such as sunburn), mucous membranes or the hands of young children (due to the risk of oral intake). Furthermore, parents should apply the products to children under 12 years of age to ensure that an appropriate amount is applied in accordance with the instructions for use and that children's hands do not come into contact with the product.

If you want to be on the safe side, you should avoid using insect repellents on children under two years of age and instead ensure that insects cannot enter the home in the first place by fitting insect screens to windows and doors. When out and about, insect nets for pushchairs can also help. Furthermore, wearing suitable long-sleeved clothing and avoiding being outdoors at dusk can help prevent mosquito bites.

Further information on biocides

Information page on biocidal products and treated goods

<https://www.bfr.bund.de/en/chemical-safety/biocidal-products-and-treated-goods/>

About the BfR

The German Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH). It protects people's health preventively in the fields of public health and veterinary public health. The BfR provides advice to the Federal Government as well as the Federal States ('Laender') on questions related to food, feed, chemical and product safety. The BfR conducts its own research on topics closely related to its assessment tasks.

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