

# Explainer: What are chemical weapons?

May 24 2013, by Mark Lorch

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Hopefully this will remain a rare sight. Credit: Edgaras Zvirblys

There was chaos on the streets of Halajba in March 1988. In this corner of Iraq, at the time Iraqi Kurdistan, people had suddenly started experiencing cold-like symptoms – tight chest and nasal congestion. Within a few minutes, those effects morphed into feeling dizzy and sick. Many started vomiting and some lost control of their bladders and bowels. Finally there were severe convulsions, as muscles that control breathing were paralysed, before succumbing to death.

The cause for this gruesome event was sarin, a nerve agent that is classed as a chemical weapon. This incident in Iraq killed thousands and was the last confirmed mass use of chemical weapons. But if [new reports](#) are proved right, the most recent use of chemical weapons may have happened as recently as last month. It is believed that the Syrian government, which in July 2012 confirmed that they possess chemical weapons, may have used [nerve gas](#) to fight the rebels.

## Weapons of mass destruction

Defining a chemical weapon is not simple, because many chemicals with legitimate uses, such as insecticides, could also be used for sinister purposes. This is why the Organisation for the Prohibition of Chemical Weapons (OPCW) defines them as:

All [toxic chemicals](#) and their precursors, except when used for purposes permitted by the Chemical Weapons Convention, are chemical weapons.

By toxic chemical they mean "any chemical which through its chemical action can cause death, temporary incapacitation or permanent harm to humans or animals". The OPCW categorises chemical weapons on how they work:

- **Blister agents** act via inhalation or contact with the skin. As the name suggests they can cause horrific [chemical burns](#) leading to blisters. They also cause blindness and permanent damage to the lungs. The class includes mustard gases used in the trenches of World War I and during the Iran-Iraq conflict of the 1980s.
- **Nerve agents** such as sarin are highly toxic and work rapidly by affecting the way that nerve signals are transmitted through the body to the brain. Sarin, for instance, acts by attaching itself to a protein that is 400 times its own size and disrupts nerve-to-nerve communication. This makes the victim lose control of all its

bodily functions.

- **Blood agents** interfere with the way that blood cells use and transport oxygen. Examples include cyanide, which may well have seen its first use in warfare during the British Crimean war, and arsenic.
- **Choking agents** affect the victims' ability to breath and also have corrosive affects on the skin and eyes. Chlorine gas, used in World War II, is an example of a choking agent.
- **Non-lethal chemical weapons**, a final category by OPCW, includes riot control agents such as tear gas.

## Your morning coffee could kill you

Scientists define the toxicity of a chemical by something called an LD50, which is the dose of that chemical required to kill half a test population. The unit of measurement for LD50 is grams per kilogram of weight of an animal. It is usually experimentally recorded by subjecting rats or mice with the chemical.

While LD50 is useful to understand the toxicity of [chemical weapons](#), it can be applied to any chemical. Here is a list of chemicals, in the ascending order of their toxicities:

- Sugar 29.7g/kg
- Salt 3g/kg
- Paracetamol 1.9g/kg
- Arsenic 0.76g/kg
- Caffeine 0.192g/kg
- Mustard gas 0.1g/kg
- Nicotine 0.05g/kg
- Cyanide 0.0064g/kg
- Sarin 0.00017g/kg
- Botulinum toxin 0.000000001g/kg

You may have rightly guessed then that the contents of your morning coffee could be more toxic than arsenic, if you so wished. Similarly botox, which is short for botulinum toxin, is regularly injected in people's foreheads as a beauty treatment. This just shows that it is the way chemicals are used that turns them into weapons, not necessarily what's in them.

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Source: The Conversation

Citation: Explainer: What are chemical weapons? (2013, May 24) retrieved 29 April 2024 from <https://phys.org/news/2013-05-chemical-weapons.html>

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