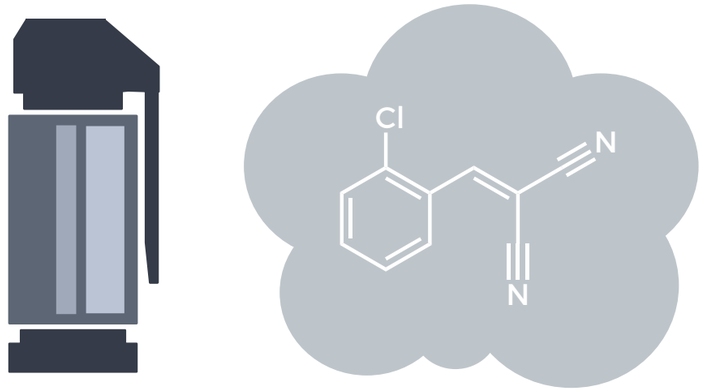
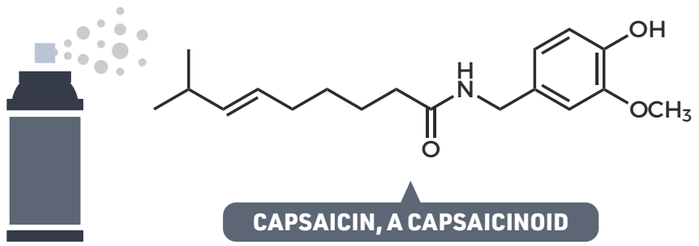
TEAR GAS: CHEMISTRY, DISPERSAL METHODS & EFFECTS

WHAT IS TEAR GAS?



The active agent in CS gas (the most commonly used tear gas) is 2-chlorobenzalmalononitrile. This is a white solid which is dispersed as microscopic particles or dissolved in a solution.



Chloracetophenone (designated CN and also known as mace) was also used historically but has been largely replaced by CS. Pepper spray differs from tear gas: it contains capsaicinoids, chemicals extracted from chillies.

TEAR GAS DISPERSAL METHODS

CS is often dispersed by burning canisters. The smoke these canisters produce disperses the tear gas as a cloud of microscopic particles into the surrounding area.

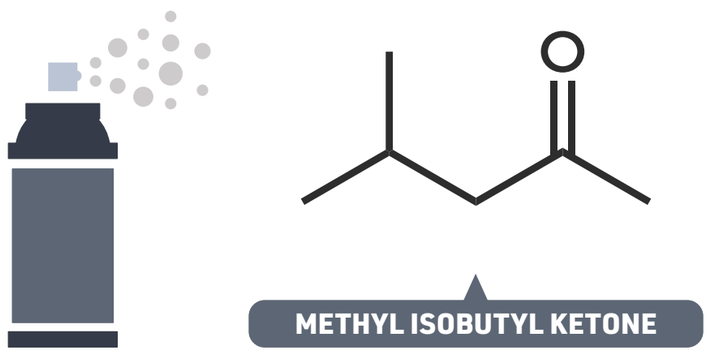
STARTER MIXTURE

The starter mixture starts burning when the canister is ignited. It contains charcoal as a fuel and potassium nitrate as an oxidiser which helps it burn faster.

SMOKE MIXTURE

The smoke mixture includes the active agent, CS. It includes sucrose as a fuel and another oxidiser, potassium chlorate, to keep the reaction going. Magnesium carbonate keeps acidity levels in check. Nitrocellulose binds everything together.

CS can also be dissolved in a solvent and used as a spray. A common solvent is methyl isobutyl ketone. A 1% CS spray is used in the US, while a 5% CS spray is used in the UK.



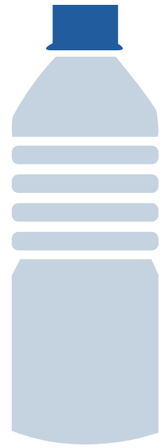
THE EFFECTS OF TEAR GAS

Exposure to tear gas irritates the eyes, nose, mouth, skin and respiratory tract. This can in turn lead to inflammation, coughing, and difficulty breathing. The effects typically last for 15–30 minutes after exposure.

People with pre-existing conditions that affect the respiratory system, such as asthma, are more vulnerable to CS exposure. There is also some evidence that CS exposure could increase susceptibility to respiratory illness.

TREATING TEAR GAS EXPOSURE

There is no antidote for tear gas. Though some sources suggest using milk or baking soda solution to wash it off, there is little evidence for these being more effective than water.



1. Escape from the contaminated area and into fresh air as soon as possible.
2. Remove contaminated clothing if possible and wipe your face to remove particles.
3. Use flowing water and soap to remove contamination from the skin. Flush your eyes with saline or water for 10–20 minutes.