AVON PROTECTION

PRODUCT WHITE PAPER

April 6, 2023

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RIOT AGENT PROTECTION BY CSCF50 AND CTCF50

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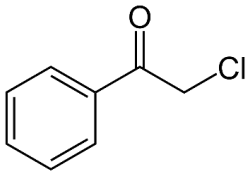
Background

A variety of riot agent chemicals are used around the world. These generally all share the same use scenario, in that they are either aerosolized chemical or chemicals suspended in water or alcohol, which is then aerosolized.

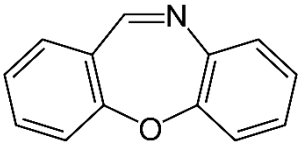
Protection

Both of Avon Protection's riot filters (CSCF50 and CTCF50) have been shown to be effective for protection against the riot agents CS and CN. To extend the protection logic to other riot agents, we compare the physical properties of the riot chemicals, as shown in the table and chemical drawings below.

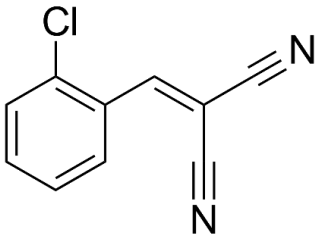
Symbol	Chemical Name	Vapor Pressure (mm Hg @ 20 °C)	Melting Point (°C)	Boiling Point (°C)	Molecular Weight (g/mol)	CAS Number
CN	2-chloroacetophenone	5.4×10^{-3}	58	244	154.59	532-27-4
CR	dibenz[b,f][1,4]oxazepine	2.1×10^{-4}	73	472	195.22	257-07-8
CS	o-chlorobenzylidene malononitrile	3.4×10^{-5}	95	310	188.62	2698-41-1
OC	oleoresin capsicum (capsaicin)	$1.3X10^{-8}$	65	210	305.41	404-86-4
PAVA	pelargonic acid vanillylamide (nonivamide)	Not reported	54	450	293.41	2444-46-4



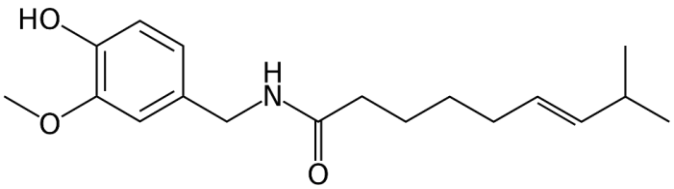
CN



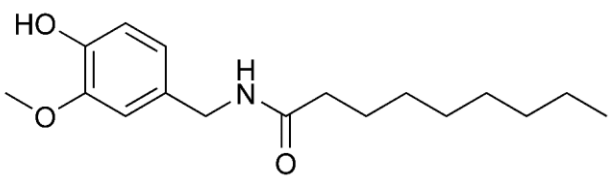
CR



CS



OC



PAVA

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The lower the vapor pressure, the more difficult it is to get the substance to turn into a gas or vapor. The physical adsorption of compounds is stronger for compounds that are difficult to make a gas/vapor. Large molecules are also easier to adsorb into the carbon and more likely to form particulates.

The physical properties of the riot agents listed are comparable and therefore, the protection characteristics will also be comparable.

In a real-world riot agent exposure situation, a person wearing a full-face mask with an Avon Riot Filter will be exposed to aerosolized agent. We assume that any residual solvent or emulsifier is diluted or lost during the energetic transmission of the aerosol, and that riot agent particles are retained by the HEPA filter media in the filter inlet during respiration. The particulate filter meets NIOSH P100 (> 99.97%) efficiencies of protection against particulates. Therefore, the vast majority of the riot agent will be captured by the particulate filter.

Any riot agent vapor passing through the particulate filter will be strongly adsorbed and captured by the carbon in the filter. The CSCF50 has thin layers of carbon cloth, whereas the CTCF50 has a thicker bed of granular carbon. The CSCF50 is designed to be thin and lightweight with lower breathing resistance. The CTCF50 is designed to provided extended protection against gaseous components of riot agents.

Both the CSCF50 and CTCF50 will provide excellent protection against the riot agents listed above, with the CTCF50 providing extended protection.

The CTCF50 is only certified by NIOSH to CS, CN, and P100. Therefore, for situations where NIOSH-certification is required, CTCF50 filters can only be used in the configurations certified by NIOSH and only against CS and CN.