

# Riot Control Agents

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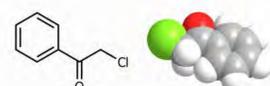
## What is the definition of a Riot Control Agent (RCA)?

From paragraph 7, Article II of the Chemical Weapons Convention:

"Any chemical not listed in a Schedule, which can produce rapidly in humans sensory irritation or disabling physical effects which disappear within a short time following termination of exposure."

## What are Riot Control Agents?

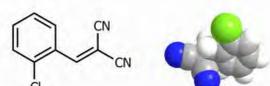
Chemicals that meet the criteria of an RCA include the following:



**2-Chloroacetophenone (CN)**

Synonyms:  
Mace, CAP, Khaf CNB (10% CN, 45% benzene, 40% carbon tetrachloride), CNC (30% CN, 70% chloroform), and CNS (23% CN, 38.4% chloropicrin, 38.4% chloroform).

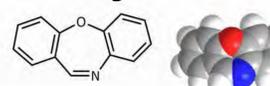
Physical states:  
White solid with odour of apple blossom  
Melting Point 54-56 °C; Boiling Point 245 °C



**2-Chlorobenzyl isocyanide (CS)**

Synonyms:  
2-Chlorobenzyl isocyanide, 2-chlorobenzyl isocyanide, K62, CS (liquid), CS1 (95% CS, 5% silica aerogel), CS2 (CS and silica aerogel), CSX (1 g CS, 99 g 14 in acetyl phosphate), CS dissolved in methyl ethyl ketone used in spray devices.

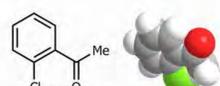
Physical states:  
White solid with pungent, penetrating odour  
Melting Point 193-195 °C  
Boiling Point 210-215 °C (dec)



**D-benzo, b, f, 1,4, oxazepine (CF)**

Synonyms:  
CF

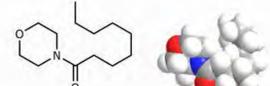
Physical states:  
Yellow stable powder  
Melting Point 72 °C; Boiling Point 335 °C



**2'-Chloroacetophenone**

Synonyms:  
2'-Chloroacetophenone

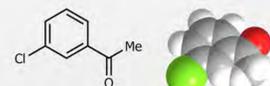
Physical states:  
Colourless liquid  
Boiling Point 229 °C



**4-Nonanoylmorpholine**

Synonyms:  
MPA, MPK, pelargonic acid morpholide

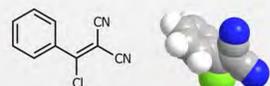
Physical states:  
Liquid  
Boiling Point 310 °C



**3'-Chloroacetophenone**

Synonyms:  
3'-Chloroacetophenone

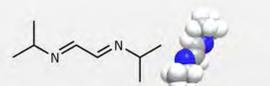
Physical states:  
Colourless liquid  
Boiling Point 228 °C



**2-Chlorobenzyl isocyanide (CS)**

Synonyms:  
none

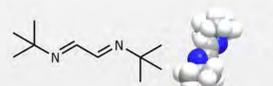
Physical states:  
White solid  
Melting Point 63-70 °C  
Boiling Point 210-215 °C (dec)



**N,N-Bis(isopropyl)ethylenediamine**

Synonyms:  
Diisiac

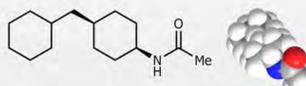
Physical states:  
Violet to a colourless solid  
Melting Point 43-50 °C



**N,N-Bis(isopropyl)ethylenediamine**

Synonyms:  
none

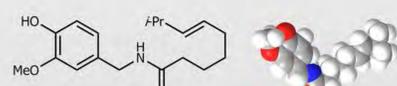
Physical states:  
White solid  
Melting Point 39-43 °C



**CS-4-Acetylaminodicyclohexylmethane**

Synonyms:  
none

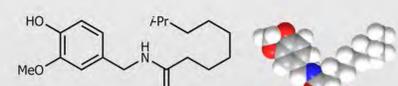
Physical states:  
White solid  
Melting Point 112 °C



**8-Vinyl-N-vanillyl-trans-8-nonanamide**

Synonyms:  
C, capsaicin, M, 1, 7, 8, 9

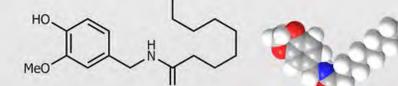
Physical states:  
White solid  
Melting Point 65 °C; Boiling Point 210-220 °C (0.01 mmHg)



**8-Methyl-N-vanillylnonanamide**

Synonyms:  
Dihydrocapsaicin, DHK

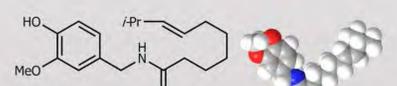
Physical states:  
White solid  
Physical data unavailable



**N-Vanillylnonanamide**

Synonyms:  
N-(4-hydroxy-2-methoxyphenyl)nonanamide, nonanamide, piperocapsaicin, pelargonic acid vanillyl amide, PAVA

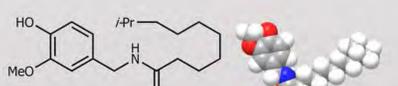
Physical states:  
White solid with slight odour  
Melting Point 157 °C



**N-Vanillyl-9-methyl-7-(E)-nonamide**

Synonyms:  
homocapsaicin

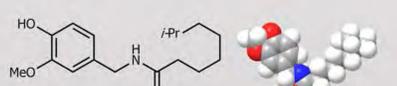
Physical states:  
Lipophilic colourless odourless crystalline or waxy solid



**N-Vanillyl-9-methyldecanamide**

Synonyms:  
homocapsaicin

Physical states:  
Lipophilic colourless odourless crystalline or waxy solid



**N-Vanillyl-7-methyloctanamide**

Synonyms:  
homocapsaicin

Physical states:  
Lipophilic colourless odourless crystalline or waxy solid

**Oleoresin capsicum (OC)**

This is a mixture containing ≥ 8% capsaicins: capsaicin, dihydrocapsaicin, and nordihydrocapsaicin dissolved in an organic solvent.

## How do Riot Control Agents work?

RCA's produce irritation through binding to TRP (Transient Receptor Potential) receptors. This activates some of the same biochemical pathways that are triggered by eating horseradish or hot peppers.

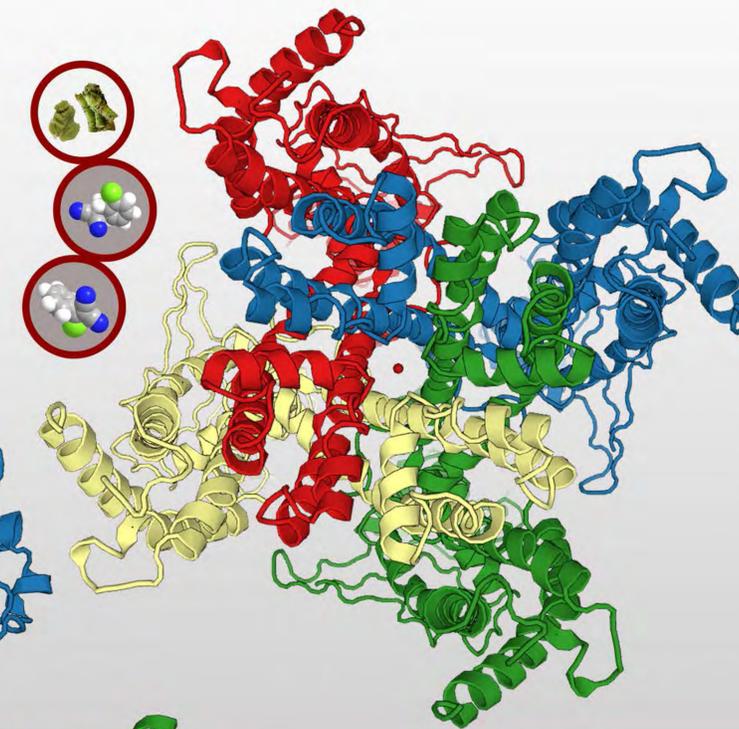
## What are TRP Receptors?

TRP receptors are a family of ion channel receptors mainly located on cell membranes of multicellular organisms. TRP receptors are classified into seven subfamilies: TRPC (canonical or classical), TRPV (vanilloid), TRPM (melastatin), TRPA (ANKTM1 homologues), TRPP (polycystin), TRPML (mucolipin), and TRPN (NOMP-C homologues).

TRP receptor functions are diverse; the receptors serve as versatile sensors that allow individual cells and entire organisms to detect changes in their environment. This includes experiencing changes in temperature, touch, taste and other stimuli (including pain).

### TRPA1

CS and isothiocyanate compounds bind to the TRPA1 receptor. Allyl isothiocyanate is the main pungent ingredient in wasabi, horseradish, and mustard oil - this chemical also binds to the TRPA1 receptor.



### TRPV1

Capsaicin, homocapsaicin, and other related compounds bind to the TRPV1 receptor. These chemicals are naturally found in hot chili peppers.

