

A Recent History of Chemical Warfare

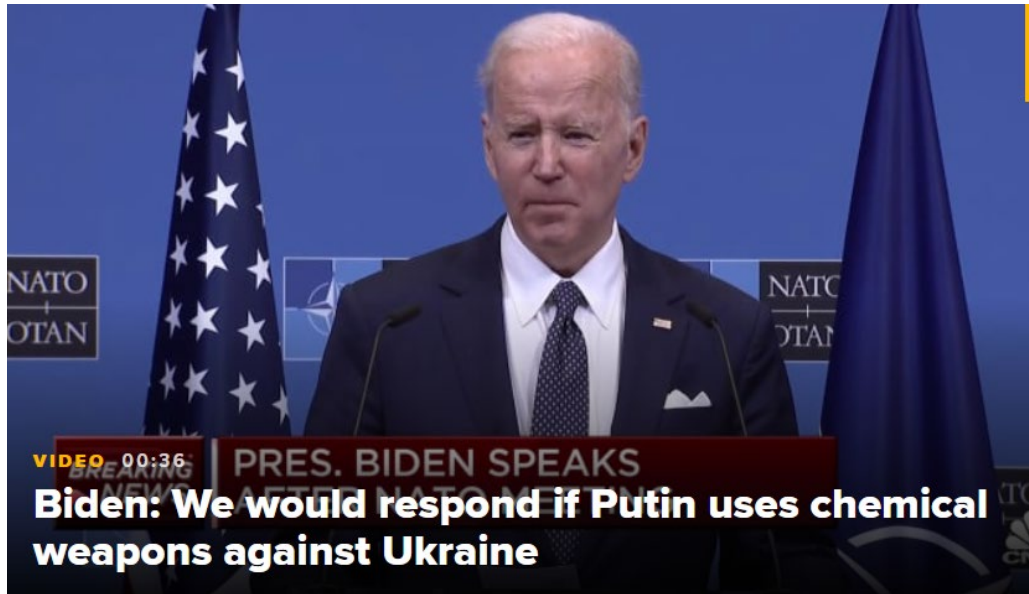
Dr. Gabriel da Silva

Associate Professor of Chemical Engineering

The University of Melbourne

A Resurgence of Chemical Warfare?

With Russia invading Ukraine, the international community has been alert to the use of chemical weapons.



And so, his back is against the wall. And he's — now he's talking about new false flags he's setting up, including he's asserting that, we, in America, have biological as well as chemical weapons in Europe — simply not true. I guarantee you.

They're also suggesting that Ukraine has biological and chemical weapons in Ukraine. That's a clear sign he is considering using both of those. He's already used chemical weapons in the past, and we should be careful of what about — of what's about to come. He knows there'll be severe consequences because of the united NATO front, but the point is: It's real.

A Resurgence of Chemical Warfare?

With Russia invading Ukraine, the international community has been alert to the use of chemical weapons.

Around April 11 2022, unconfirmed reports emerged of chemical weapons use in Mariupol, Ukraine.



Chemical weapons: how will we know if they have been used in Ukraine?

Published: April 19, 2022 2.27pm AEST

A Resurgence of Chemical Warfare?

What might a chemical weapons attack look like in 2022?

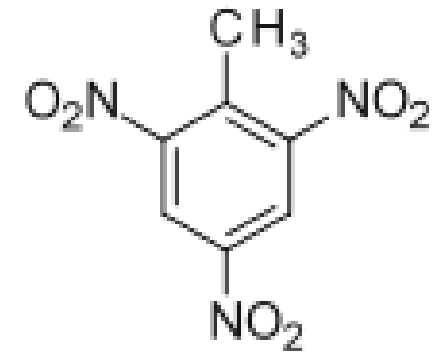
To answer this, need to understand the origins of chemical warfare (WWI), the prohibition of chemical weapons (Geneva Protocol and Chemical Weapons Convention, CWC), and the enforcement of the convention. Also need to look to recent chemical weapons incidents.

The CWC can not prevent chemical weapons attacks, but it is making them less likely and less severe.

The Chemist's War

Chemistry was central to WWI, a post industrial revolution war.

- Combustion engines (~1890)
- TNT (~1890)
- Aircraft (~ 1900)
- Ammonia from air (~ 1910)



TNT (trinitrotoluene)

Not surprising that chemistry was harnessed however it could for the war.

The Chemist's War

WWI chemical weapons were crude, ineffective, and often backfired.

- Over 1 million casualties, less than 100,00 fatalities.
- Protection measures (gas masks) made them redundant.
- Use of poisons already a war crime.

Weapons:

- Tear gas
- Chlorine
- Phosgene (CG)
- Sulfur mustard (HD)



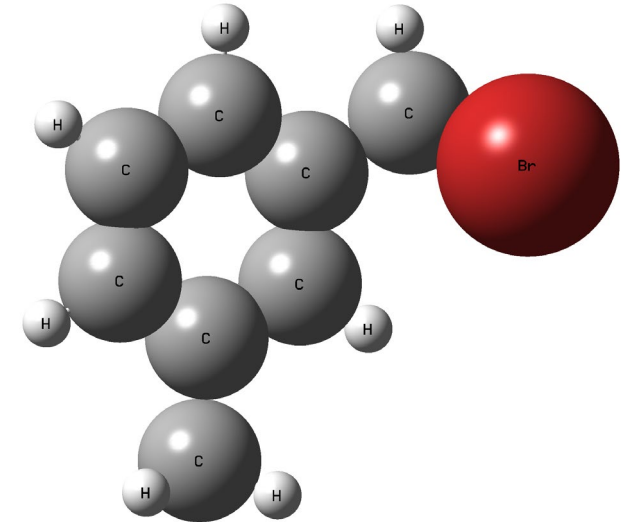
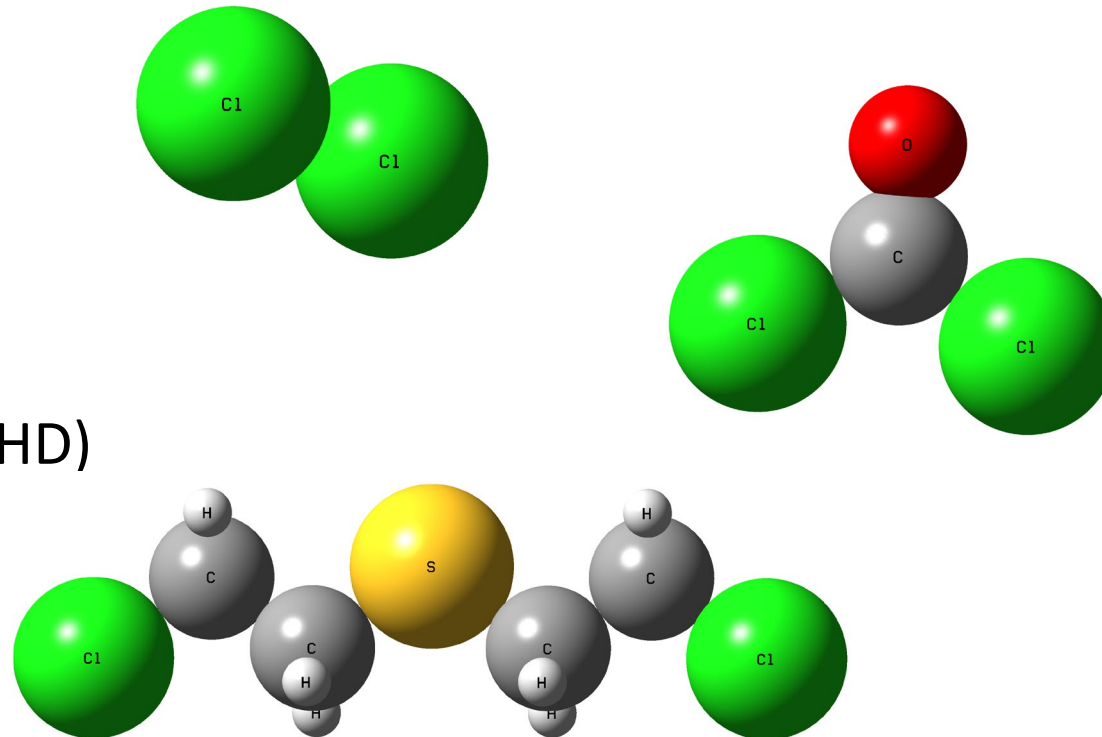
The Chemist's War

WWI chemical weapons were crude, ineffective, and often backfired.

- Over 1 million casualties, less than 100,00 fatalities.
- Protection measures (gas masks) made them redundant.
- Use of poisons already a war crime.

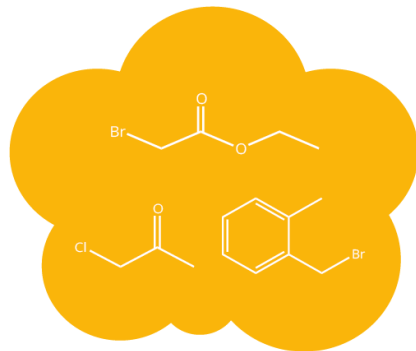
Weapons:

- Tear gas
- Chlorine
- Phosgene (CG)
- Sulfur mustard (HD)



CHEMICAL WARFARE WORLD WAR 1

WORLD WAR ONE IS SEEN AS THE DAWN OF MODERN CHEMICAL WARFARE, WITH A VARIETY OF DIFFERENT CHEMICAL AGENTS BEING EMPLOYED ON A LARGE SCALE, RESULTING IN APPROXIMATELY 1,240,000 NON-FATAL CASUALTIES, AND 91,000 FATALITIES. A VARIETY OF POISONOUS GASES WERE USED THROUGHOUT THE CONFLICT, WITH EACH HAVING DIFFERING EFFECTS UPON VICTIMS.



TEAR GASES

(ethyl bromoacetate, chloroacetone & xylol bromide)

SMELL & APPEARANCE

Both ethyl bromoacetate and chloroacetone are colourless to light yellow liquids with fruity, pungent odours. Xylol bromide is a colourless liquid with a pleasant, aromatic odour.

EFFECTS

Tear gases are what is known as 'lachrymatory agents' - they irritate mucous membranes in the eyes, mouth, throat & lungs, leading to crying, coughing, breathing difficulties, and temporary blindness.

FIRST USED

1914

In August 1914, the French forces used tear gas grenades against the German army, to little effect.

ESTIMATED CASUALTIES

0
fatal

These gases were used to incapacitate enemies rather than to kill; symptoms commonly resolved within 30 minutes of leaving the affected area.



CHLORINE

SMELL & APPEARANCE

Chlorine is a yellow-green gas with a strong, bleach-like odour. Soldiers described its smell as 'a distinct mix of pepper and pineapple'.

EFFECTS

Chlorine reacts with water in the lungs, forming hydrochloric acid. It can cause coughing, vomiting, and irritation to the eyes at low concentrations, and rapid death at concentrations of 1000 parts per million.

FIRST USED

1915

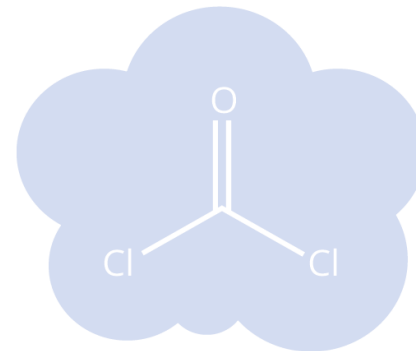
Used by German forces at Ypres in April 1915. British forces used it for the first time at Loos in September.

ESTIMATED CASUALTIES

5,000

number of fatalities in first use of chlorine at Ypres

Chlorine was devastating as troops were initially unequipped to deal with it. Later, gas masks limited its effectiveness.



PHOSGENE

(carbonyl dichloride)

SMELL & APPEARANCE

Phosgene is a colourless gas with a musty odour comparable to that of newly mown hay or grass. If the odour is detectable, it indicates a hazardous level of phosgene. Its density is four times that of air.

EFFECTS

Reacts with proteins in lung alveoli, causing suffocation. Causes coughing, difficulty breathing and irritation to the throat & eyes. Can cause delayed effects, not evident for 48hrs, including fluid in the lungs & death.

FIRST USED

1915

In December 1915, the German forces used phosgene against the British at Ypres.

ESTIMATED CASUALTIES

85%

of all gas-related fatalities

It's estimated 85% of all gas-related fatalities in World War 1 resulted from phosgene. It was often used in combination with chlorine.



MUSTARD GAS

(bis(2-chloroethyl) sulfide)

SMELL & APPEARANCE

When pure, mustard gas is a colourless and odourless liquid, but it's used as a chemical agent in impure form. These are yellow-brown in colour and have an odour resembling garlic or horseradish.

EFFECTS

Powerful irritant and vesicant (blistering agent) that can damage the eyes, skin, & respiratory tract. Causes chemical burns on contact with skin. Forms intermediates that react with DNA leading to cell death.

FIRST USED

1917

On 12th July 1917, German forces used mustard gas against the British at Ypres.

ESTIMATED CASUALTIES

2-3%

mortality rate of mustard gas casualties

The mortality rate of mustard gas casualties was low - but its effects were debilitating, and patients required elaborate care.



The Chemist's War

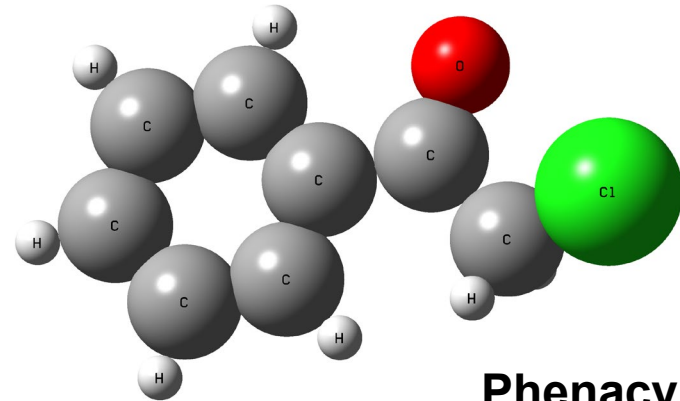
Early chemical weapons caused:

Tearing (lachrymatory agents)

Chemical burns (blister agents)

Asphyxiation

Poisoning



What makes pepper spray so intense? And is it a tear gas? A chemical engineer explains

Published: June 12, 2020 5:56am AEST

Post-WWI

Geneva Protocol (1925) banned the use of chemical and biological weapons.

- Could still be developed and stockpiled.

Not used in WWII but an arms race was set.

UNITED STATES: RATIFICATION OF THE 1925 GENEVA PROTOCOL FOR THE PROHIBITION OF THE USE IN WAR OF ASPHYXIATING, POISONOUS OR OTHER GASES, AND OF BACTERIOLOGICAL METHODS OF WARFARE* [Ratified by the United States, January 22, 1975]

PROTOCOL FOR THE PROHIBITION OF THE USE IN WAR OF ASPHYXIATING, POISONOUS OR OTHER GASES, AND OF BACTERIOLOGICAL METHODS OF WARFARE

The Undersigned Plenipotentiaries, in the name of their respective Governments:

Whereas the use in war of asphyxiating, poisonous or other gases, and of analogous liquids, materials or devices, has been justly condemned by the general opinion of the civilized world; and

Whereas the prohibition of such use has been declared in Treaties to which the majority of Powers of the world are Parties; and

To the end that this prohibition shall be universally accepted as a part of International Law, binding alike the conscience and the practice of nations;

Declare:

That the High Contracting Parties, so far as they are not already Parties to Treaties prohibiting such use, accept this prohibition, agree to extend this prohibition to the use, of bacteriological methods of warfare and agree to be bound as between themselves according to the terms of this declaration.

The High Contracting Parties will exert every effort to induce other States to accede to the present Protocol. Such accession will be notified to the Government of the French Republic, and by the latter to all signatory and acceding Powers, and will take effect on the date of the notification by the Government of the French Republic.

The present Protocol, of which the French and English texts are both authentic, shall be ratified as soon as possible. It shall bear today's date.

The ratifications of the present Protocol shall be addressed to the Government of the French Republic, which will at once notify the deposit of such ratification to each of the signatory and acceding Powers.

The instruments of ratification and accession to the present Protocol will remain deposited in the archives of the Government of the French Republic.

The present Protocol will come into force for each signatory Power as from the date of deposit of its ratification, and, from that moment, each Power will be bound as regards other Powers which have already deposited their ratifications.

In witness whereof the Plenipotentiaries have signed the present Protocol.

Done at Geneva in a single copy, this seventeenth day of June, One Thousand Nine Hundred and Twenty-Five.

For Germany: H. von ECKARDT.
 For the United States of America: THEODORE E. BURTON; and HUGH S. GIBSON.
 For Austria: E. FRLJGL.
 For Belgium: FERDINAND FELTZER.
 For Brazil: CONTRE-ALMIRAL A. C. DE SOUZA E SILVA; and MAJOR ESTEVÃO LETRÃO DE CARVALHO.
 For the British Empire: I declare that my signature does not bind India or any British Dominion which is a separate Member of the League of Nations & does not separately sign or adhere to the Protocol.—ONSLOW.
 For Canada: WALTER A. RINDLELL.
 For the Irish Free State:
 For India: P. Z. COX.
 For Bulgaria: D. MIKOFF.
 For Chile: LUIS CABRERA; and Général de Division.

For China:
 For Colombia:
 For Denmark: A. OLDENBURG.
 For Egypt: AHMED EL KADRY.
 For Spain: EMILIO DE PALACIOS.
 For Estonia: J. LAIDONER.
 For Abyssinia: GUÉFATCHOU; BLATA HEROUT HEROUY; and A. TASFALÉ.
 For Finland: O. ENCKELL.
 For France: J. PAUL-BONCOUR.
 For Greece: VASSILI DENDRAMIS; and D. VLACHOPOULOS.
 For Hungary:
 For Italy: PIETRO CHIMENTI; and ALBERTO DE MARINIS-STENDARDO.
 For Japan: M. MATSUDA.
 For Latvia: COLONEL HARTMANIS.
 For Lithuania: DR. ZAUNIVIS.
 For Luxembourg: CH. G. VISMARE.
 For Nicaragua: A. BOTTLE.
 For Norway: CHR. L. LANGE.
 For Panama:
 For the Netherlands: W. DOUDE VAN TROOSTWIJK; and W. GUEBIN.
 For Persia:
 For Poland: GÉNÉRAL CASIMIR SOSNIKOWSKI; and G. D. MORAWSKI.
 For Portugal: A. M. BARTHOLOMEU FERREIRA; and AMÉRICO DA COSTA LEME.
 For Roumania: Ad referendum—N. P. COMENENE; and GÉNÉRAL T. DUMITRESCU.
 For Salvador: J. GUSTAVO GUERRERO.
 For Siam: M. C. VIRELYA.
 For Sweden: EINAR HENNINGER.
 For Switzerland: Sous réserve de ratification: LOHNER; and ED. MÜLLER.
 For the Kingdom of the Serbs Croats and Slovenes: J. DOUBCHITCH; GÉNÉRAL KALAFATOVITCH; and CAPT. D. PÉKO. MARIASINITCH.
 For Czechoslovakia: DR. VEVERKA FREDINAND.
 For Turkey: M. TEVFIK.
 For Uruguay: ENRIQUE E. BUERO.
 For Venezuela: C. PARRA PÉREZ.

States Parties to the Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases and of Bacteriological Methods of Warfare, done at Geneva June 17, 1925

States which have deposited instruments of ratification, accession or continue to be bound as the result of succession agreements concluded by them or by reason of notifications given by them to the Secretary-General of the United Nations:

Argentina—May 12, 1969
 Australia—Jan. 22, 1930^{1a,b}
 Austria—May 9, 1928
 Barbados^{1a,b}
 Belgium—Dec. 4, 1928^{1a,b}
 Bolivia^{1a,b}
 Bulgaria—Mar. 7, 1934^{1a,b}
 Burma^{1a,b}
 Canada—May 6, 1930^{1a,b}
 Ceylon—Jan. 20, 1954
 Chile—July 2, 1935^{1a,b}
 China—Aug. 7, 1929
 China, Dem. People's Rep.—Aug. 9, 1952^{1a,b}
 Cuba—June 24, 1966
 Cyprus—Dec. 12, 1966
 Czechoslovakia—Aug. 16, 1938^{1a,b}
 Denmark—May 5, 1930
 Estonia—Aug. 28, 1931^{1a,b}
 Ethiopia—Sept. 18, 1935
 Finland—June 26, 1929
 France—May 9, 1926^{1a,b}
 Gambia, The—Nov. 16, 1966

Germany, Fed. Rep.—Apr. 25, 1929
 Ghana—May 3, 1967
 Greece—May 30, 1931
 Guyana^{1a,b}
 Holy See—Oct. 18, 1966
 Hungary—Oct. 11, 1952
 Iceland—Nov. 2, 1967
 India—Apr. 9, 1930^{1a,b}
 Indonesia^{1a,b}
 Iran—July 4, 1929
 Iraq—Sept. 6, 1931^{1a,b}
 Ireland—Aug. 18, 1930^{1a,b}
 Israel—Feb. 20, 1969^{1a,b}
 Italy—Apr. 3, 1928
 Jamaica^{1a,b}
 Japan—May 21, 1970
 Latvia—June 3, 1931
 Lebanon—Apr. 17, 1969
 Lesotho^{1a,b}
 Liberia—Apr. 2, 1927
 Lithuania—June 15, 1933
 Luxembourg—Sept. 1, 1936
 Madagascar—Aug. 12, 1967
 Malawi^{1a,b}
 Malaysia^{1a,b}
 Maldives Islands—Jan. 6, 1967
 Malta^{1a,b}
 Mauritius^{1a,b}
 Mexico—Mar. 15, 1932
 Monaco—Jan. 6, 1967
 Mongolia—Dec. 6, 1968^{1a,b}
 Nepal—May 9, 1969
 Netherlands—Oct. 31, 1930^{1a,b}
 New Zealand—Jan. 22, 1930^{1a,b}
 Niger—Apr. 19, 1967
 Nigeria—Oct. 15, 1968^{1a,b}
 Norway—July 27, 1932
 Pakistan—June 9, 1960
 Paraguay—Jan. 14, 1969
 Poland—Feb. 4, 1929
 Portugal—July 1, 1930^{1a,b}
 Romania—Aug. 23, 1929^{1a,b}
 Rwanda—June 25, 1964
 Sierra Leone—Mar. 20, 1967
 Singapore^{1a,b}
 South Africa—Jan. 30, 1930^{1a,b}
 Spain—Aug. 22, 1929^{1a,b}
 Swaziland^{1a,b}
 Sweden—Apr. 25, 1930
 Switzerland—July 12, 1932
 Syrian Arab Rep.—Dec. 17, 1968^{1a,b}
 Tanzania—Apr. 22, 1963
 Thailand—June 6, 1931
 Trinidad and Tobago^{1a,b}
 Tunisia—July 12, 1967
 Turkey—Oct. 5, 1929
 Uganda—May 24, 1965
 U.S.S.R.—Apr. 5, 1928^{1a,b}
 United Arab Rep.—Dec. 6, 1928
 United Kingdom—Apr. 9, 1930^{1a,b}
 Venezuela—Feb. 8, 1929
 Yugoslavia—Apr. 12, 1929^{1a,b}
 Zambia^{1a,b}

^{1a,b,c,d} With reservations to Protocol as follows:
^a binding only as regards relations with other parties
^b to cease to be binding in regard to any enemy States whose armed forces or allies do not observe provisions
^c to cease to be binding as regards use of chemical agents with respect to any enemy State whose armed forces or allies do not observe provisions
^d does not constitute recognition of or involve treaty relations with Israel
^e By virtue of agreement with former par-

*[Reproduced from the U.S. Congressional Record, Vol. 120, No. 176 (December 16, 1974).]

[The U.S. Senate gave its advice and consent to ratification subject to the reservation on the following page on December 16, 1974. The vote was 90 in favor to none against, with 10 members not present and voting. The statement by the President, made at the signing of the instrument of ratification, appears at I.L.M. page 299.]

Post-WWI

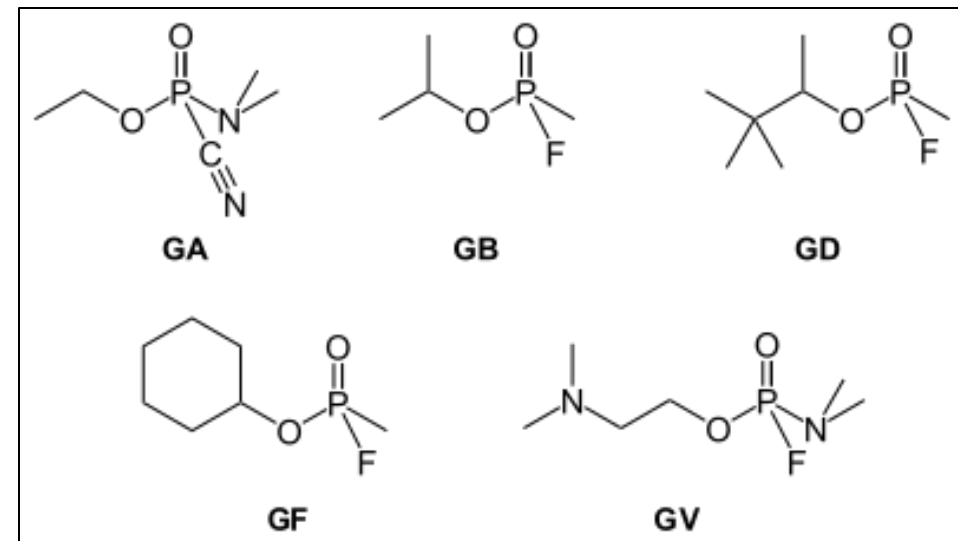
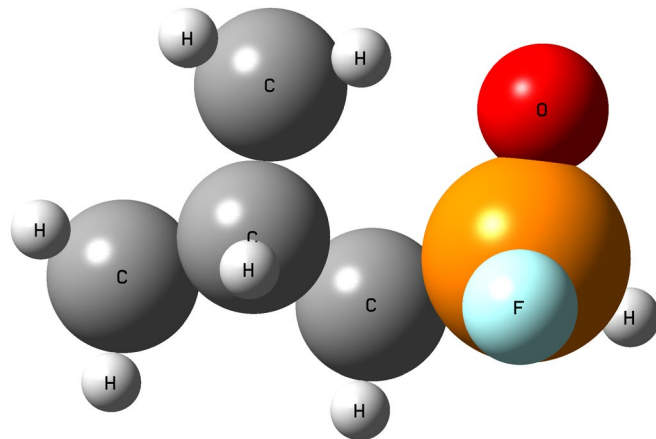
1936: The chemical tabun was discovered in a German insecticide lab.

A lethal poison, it was the first known human nerve agent.

It was reported to the Nazi government, and a nerve agent program begun (G-series).

1938: Sarin (GB)

1944: Soman (GD)



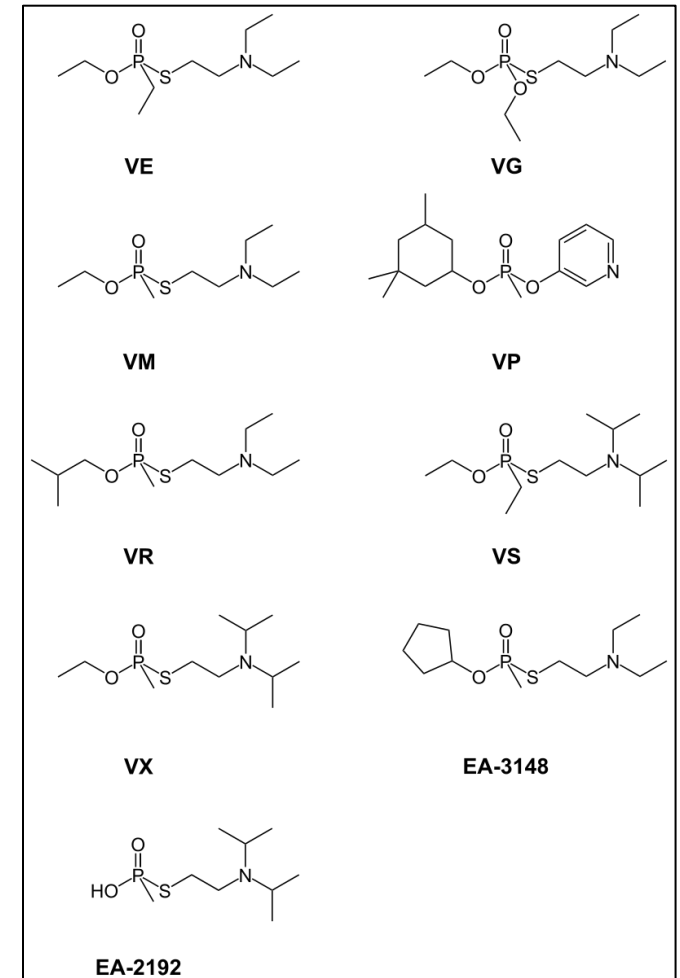
Post-WWI

1936: The chemical tabun was discovered in a German insecticide lab.

A lethal poison, it was the first known human nerve agent.

Research in the UK in the 1950s saw potent V-series compounds developed

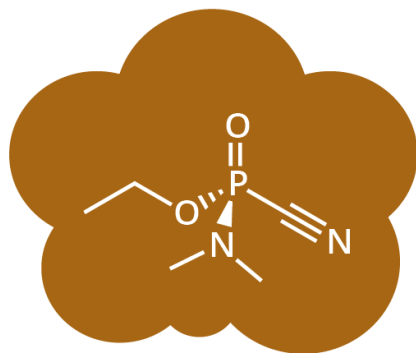
G- and V-series nerve agents mostly organophosphates – similar to pesticides, plasticisers, fire retardants, *etc.*



CHEMICAL WARFARE NERVE AGENTS

PART ONE: THE G SERIES

THE G SERIES NERVE AGENTS ARE SO NAMED BECAUSE THEY WERE ALL FIRST SYNTHESISED IN GERMANY. THEY ARE ALL EXTREMELY TOXIC VOLATILE LIQUIDS, CLASSIFIED AS WEAPONS OF MASS DESTRUCTION BY THE U.N., AND THEIR PRODUCTION & STOCKPILING IS OUTLAWED.



TABUN (GA)

(ethyl dimethylphosphoramidocyanidate)

SMELL & APPEARANCE

Clear, colourless liquid, though impure tabun can have a brown appearance. Pure tabun is odourless, but it often has a faint 'fruity' odour due to impurities.

SYNTHESISED

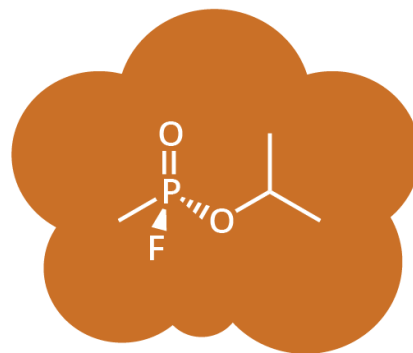
1936

Discovered accidentally by Gebhardt Schrader, a German chemist who was investigating organophosphates as pesticides.

LETHALITY

median lethal concentration
400
milligram-minutes per
cubic metre

median lethal dose
4000
milligrams per person
(skin exposure)



SARIN (GB)

(isopropyl methylphosphonofluoridate)

SMELL & APPEARANCE

A clear, colourless liquid, tasteless and odourless in its pure form. It's a volatile liquid; like other nerve gases the vapour generated is heavier than air.

SYNTHESISED

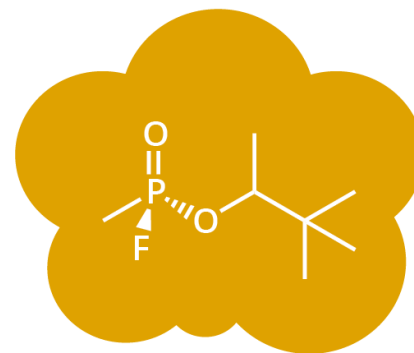
1938

Named after the team of scientists behind its initial discovery: Schrader, Ambros, Ritter & Van der Linde

LETHALITY

median lethal concentration
100
milligram-minutes per
cubic metre

median lethal dose
1700
milligrams per person
(skin exposure)



SOMAN (GD)

(3,3-dimethylbutan-2-yl methylphosphonofluoridate)

SMELL & APPEARANCE

Soman is a clear, colourless, tasteless liquid. Its odour is faint when pure, but when impure it has a yellow-brown colour and has a strong, camphorous odour.

SYNTHESISED

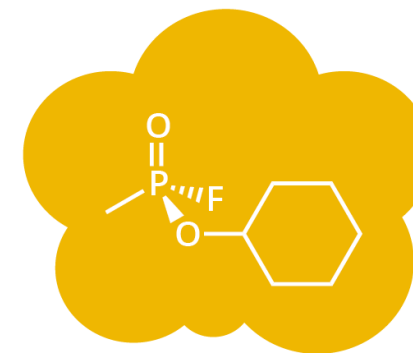
1944

Discovered during research into the pharmacology of tabun & sarin funded by the German army.

LETHALITY

median lethal concentration
70
milligram-minutes per
cubic metre

median lethal dose
300
milligrams per person
(skin exposure)



CYCLOSARIN (GF)

(cyclohexyl methylphosphonofluoridate)

SMELL & APPEARANCE

Clear, colourless liquid with a sweet, musty smell, sometimes likened to peaches. It evaporates around 70 times slower than sarin, and is also flammable.

SYNTHESISED

1949

Also a result of German research, Iraq is the only country known to have manufactured significant quantities.

LETHALITY

median lethal concentration
50
milligram-minutes per
cubic metre

median lethal dose
350
milligrams per person
(skin exposure)

EFFECTS OF NERVE AGENTS



Inhibit breakdown of acetylcholine



Cause contraction of the pupils



Excessive mucus, tears, saliva & sweat



Nausea, gastrointestinal pain & vomiting



Bronchoconstriction & chest tightness



Spasms, convulsions & loss of bowel control



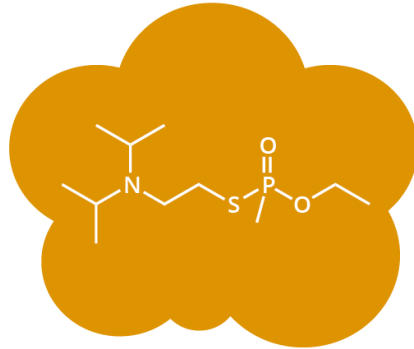
Coma & eventual death



CHEMICAL WARFARE NERVE AGENTS

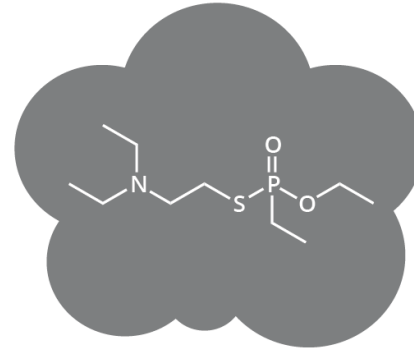
PART TWO: THE V SERIES

THE V SERIES NERVE AGENTS ARE HIGHLY TOXIC CHEMICAL WARFARE AGENTS. THE 'V' STANDS FOR 'VENOMOUS'. THEY WERE DISCOVERED IN THE UK IN THE 1950s, AND LATER VX WAS DEVELOPED FOR MILITARY USE BY THE UNITED STATES, THOUGH IT HAS NEVER BEEN USED IN WARFARE.



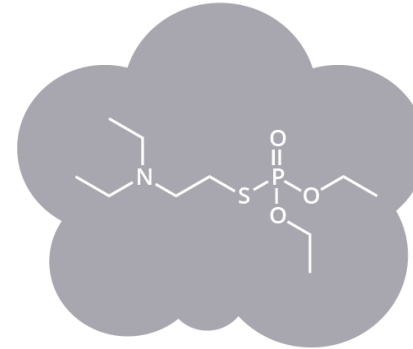
VX

(O-Ethyl-S-[2-(diisopropylamino)ethyl] methylphosphonothioate)
(the compound known as 'Russian VX' is an isomer of this compound)



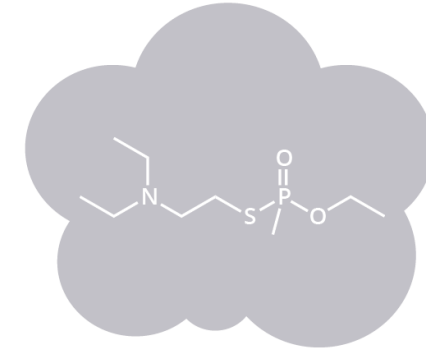
VE

O-Ethyl-S-[2-(diethylamino)ethyl] ethylphosphonothioate



VG

O,O-Diethyl-S-[2-(diethylamino)ethyl] phosphorothioate



VM

O-Ethyl-S-[2-(diethylamino)ethyl] methylphosphonothioate

SMELL & APPEARANCE



Pure VX is a colourless liquid, but more commonly it is an amber-coloured, oily, odourless liquid.



The other V series nerve agents are thought to be odourless, colourless liquids at room temperature (when pure). As they have not been studied in detail outside of military investigations as to their usefulness in warfare, little more is known about them.



Generally, their volatilities are low, though VX is the member of the series with the lowest volatility.



DISCOVERY

**1952-1955
UNITED KINGDOM**

The V series nerve agents were discovered during work to synthesise pesticides and insecticides. VG was originally sold as an insecticide, under the name 'Amiton'. It was marketed from 1954, but later withdrawn after the issues with human toxicity became apparent.

UK research on the compounds stopped in 1956, but was traded with the US in exchange for information on building thermonuclear devices.

USAGE & FATALITIES



As the V series agents exist primarily as low volatility liquids, they are designed for use as area-denial agents.



The only recorded human fatality as a result of VX is in Japan in 1994, when a sect used it to assassinate a former member. It may have also been used in Iraq by Saddam Hussein, though there is no conclusive evidence.

Sheep fared less well: Over 6000 were killed or injured in 1968 after a test in Utah, USA, with leftover VX leaking from a dispenser suggested as the likely accidental cause.



Production of VX was banned in the US in 1969. Its production and stockpiling was outlawed worldwide in 1993.

LETHALITY

FIGURES FOR VX

median lethal concentration

15

milligram-minutes per cubic metre

median lethal dose

10

milligrams per person (skin exposure)

Due to the scarcity of research on the V series nerve agents, data on lethality is only reliably available for VX. The other V series agents are thought to have roughly similar toxicities.

They have low volatilities - VX is around 2000 times less volatile than sarin - so the primary method of exposure is often through skin contact, rather than inhalation.

EFFECTS OF NERVE AGENTS



Inhibit breakdown of acetylcholine



Cause contraction of the pupils



Excessive mucus, tears, saliva & sweat



Nausea, gastrointestinal pain & vomiting



Bronchoconstriction & chest tightness



Spasms, convulsions & loss of bowel control



Coma & eventual death



Post-WWII

During the cold war, the US and Russia amassed huge stockpiles of nerve agents and other chemical weapons.



Post-WWII

During the cold war, the US and Russia amassed huge stockpiles of nerve agents and other chemical weapons.



Chemical Weapons Convention Era

In 1997, a new treaty came into effect.

Banned large scale development, production, stockpiling, and transport of chemical weapons and their precursors.

The OPCW was created to administer the CWC, with powers to monitor production, destruction, and use of chemical weapons.

Inspection and monitoring of dual-use facilities (phosgene, pesticide plants).

Chemical Weapons Convention

Article 1, Part 1

Each State Party to this Convention undertakes never under any circumstances:

- a)** To develop, produce, otherwise acquire, stockpile or retain chemical weapons, or transfer, directly or indirectly, chemical weapons to anyone;
- b)** To use chemical weapons;
- c)** To engage in any military preparations to use chemical weapons;
- d)** To assist, encourage or induce, in any way, anyone to engage in any activity prohibited to a State Party under this Convention.

OPCW



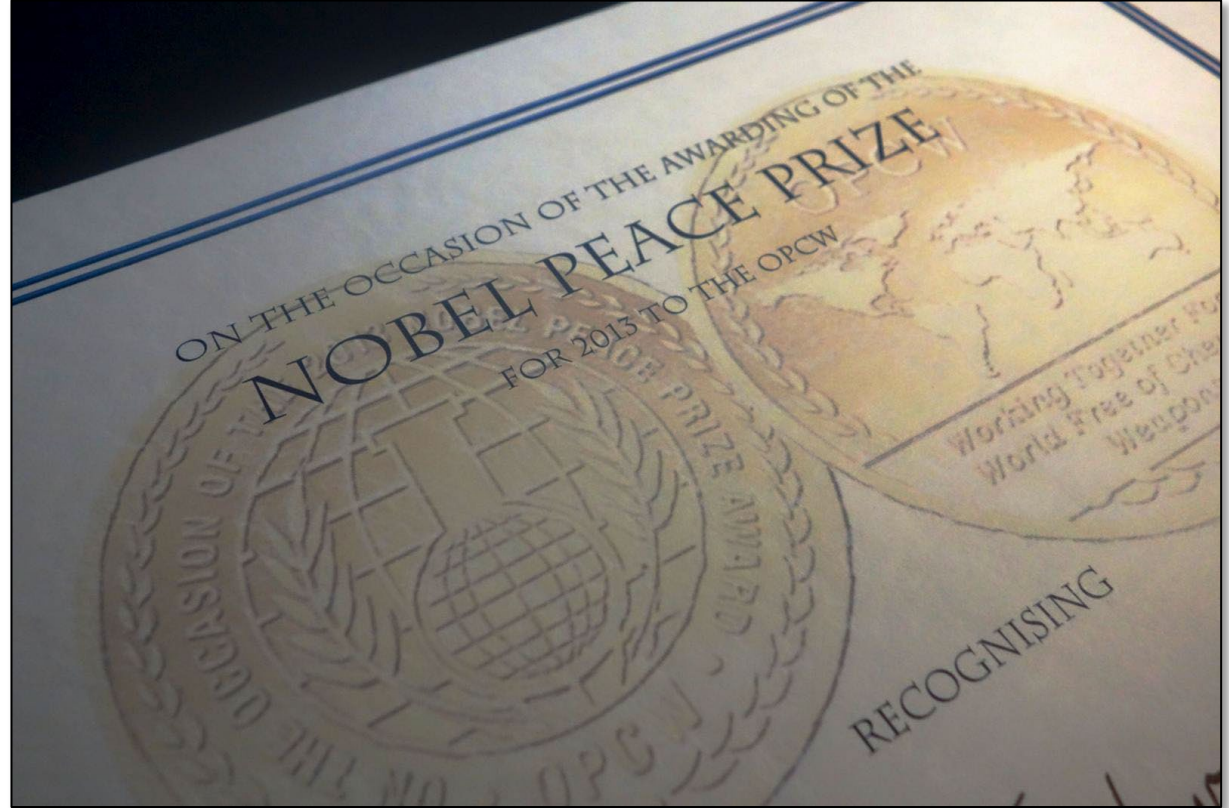
Chemical Weapons Convention Era

In 1997, a new treaty came into effect.

Banned large scale development, production, stockpiling, and transport of chemical weapons and their pre-cursors.

The OPCW was created to administer the CWC, with powers to monitor production, destruction, and use of chemical weapons.

Inspection and monitoring of dual-use facilities (phosgene, pesticide plants).





Bluegrass, KY



Bluegrass, KY

Chemical Weapons Convention Era

With declared stockpiles almost destroyed, the threat of chemical warfare has shifted.

USA has used WMD as a “red line” for military intervention:

- Iraq
- Syria

Inside the White House During the Syrian 'Red Line' Crisis

We in the Obama administration stepped up to the brink of military action against Assad. And then, suddenly, we stepped back.

By Ben Rhodes



Then-President Barack Obama photographed with top advisers, discussing possible responses to a chemical attack in Syria in August 2013. (White House / Reuters)

'Blot' on Powell's record: Lies to the UN about Iraq's weapons

Powell used his reputation for credibility to help convince the world Saddam Hussein was an imminent threat, but the US intel was false.



US Secretary of State Colin Powell held up a vial he said could contain anthrax, a biological weapon, as he accused Iraq of developing weapons of mass destruction before the United Nations Security Council [File: Elise Amendola/AP Photo]

Chemical Weapons Convention Era

With declared stockpiles almost destroyed, the threat of chemical warfare has shifted.

USA has used WMD as a “red line” for military intervention:

- Iraq
- Syria

Russia has used CW accusations for false flag operations. Other nations use CWs as a bargaining tool.

Moscow Theatre Siege (2002)

October 23, 2002, Chechen terrorists take control of the Theatre, holding > 800 hostages.

Day 4 of the crisis special forces raided the theatre. Gas was pumped through the ventilation system, with estimated casualties of 100 – 200 people.

The gas was an unknown and undeclared chemical weapon.



House of Culture of State Ball Bearing Plant Number 1



Moscow Theatre Siege (2002)

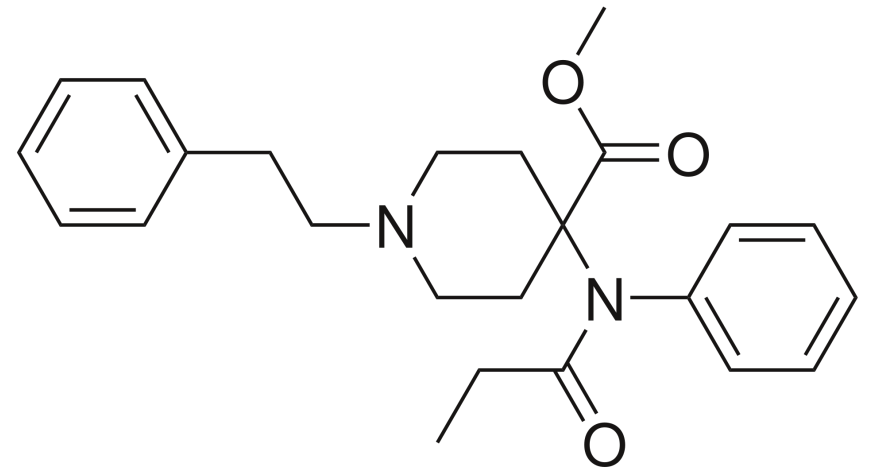
October 23, 2002, Chechen terrorists take control of the Theatre, holding > 800 hostages.

Day 4 of the crisis special forces raided the theatre. Gas was pumped through the ventilation system, with estimated casualties of 100 – 200 people.

The gas was an unknown and undeclared chemical weapon.

An anaesthetic derivative of fentanyl which suppresses respiratory system.

- A new class of weapon
- Untested, unpredictable



Carfentanyl

Syrian Civil War (2012 -)

Syria had an active chemical weapons program from the 1970s, and CWs have been used many times in the ongoing civil conflict.

Khan al-Assal	19 March, 2013	Sarin
Ghouta	21 August, 2013	Sarin

OPCW – UN established joint missions to attribute responsibility.

- Limited Syrian capacity to carry out Sarin attacks.
- Use of chlorine intensified.



Poisoning of Sergei and Yulia Skripal (2018)

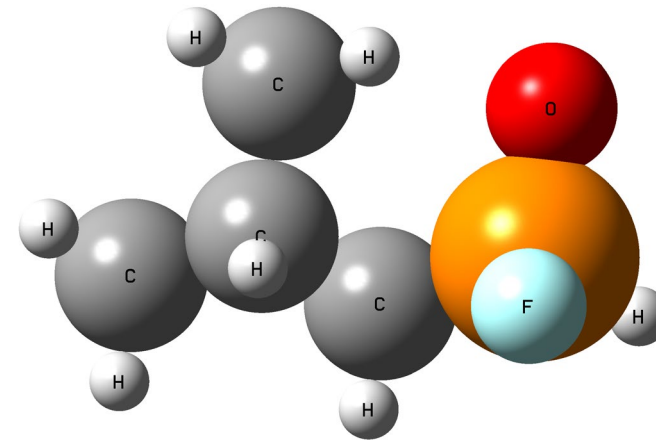
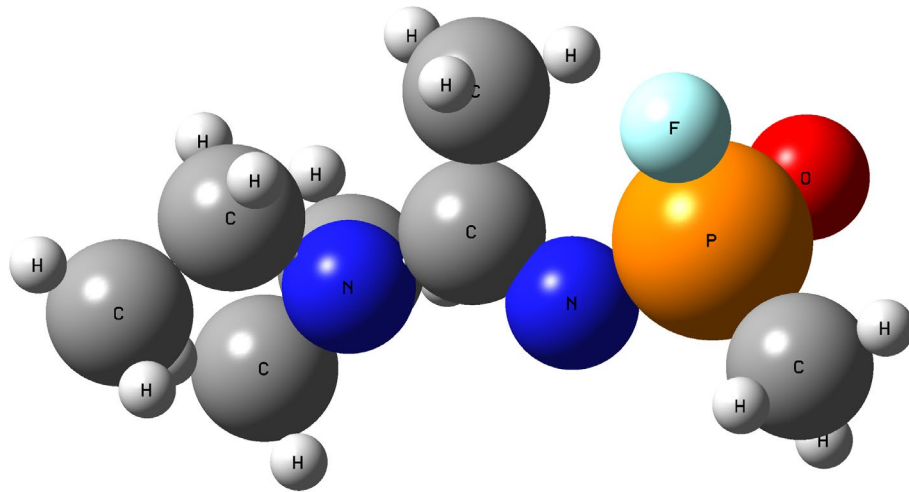
Clandestine Russian poisoning of former intelligence officer in the UK.



Poisoning of Sergei and Yulia Skripal (2018)

Clandestine Russian poisoning of former intelligence officer in the UK.

Samples analysed by Porton Downs and OPCW revealed a new type of nerve agent – a Novichok compound.

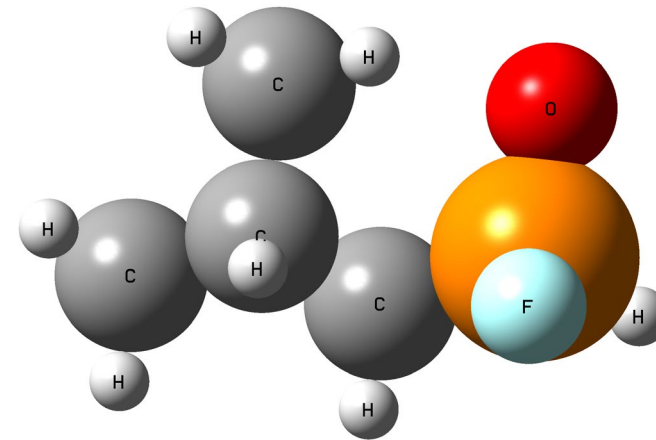
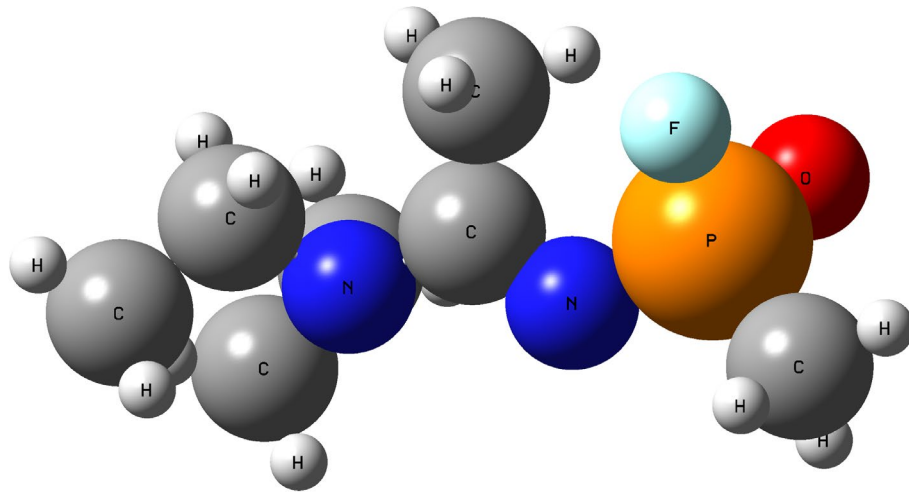


Evidence of long-suspected weapons program.

Poisoning of Sergei and Yulia Skripal (2018)

Clandestine Russian poisoning of former intelligence officer in the UK.

Allegedly used again in the poisoning of Alexei Navalny (2020).



WHAT ARE NOVICHOK NERVE AGENTS?

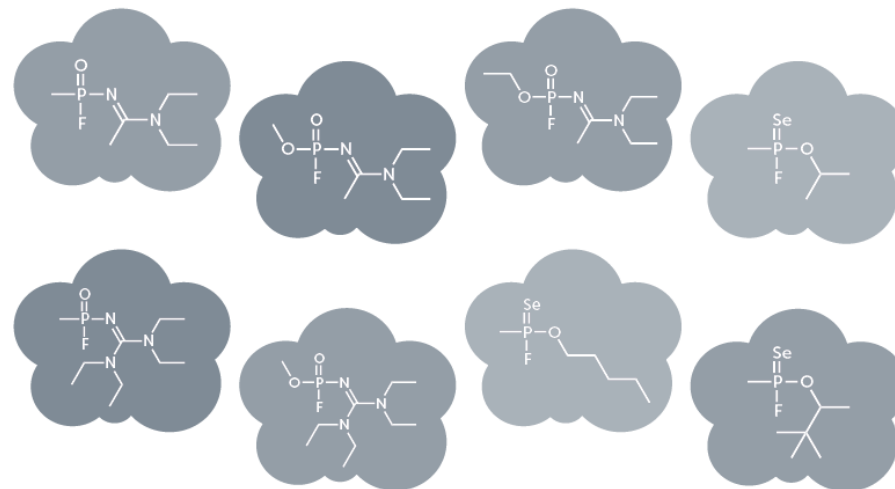
WHAT ARE NOVICHOK AGENTS?

Novichok agents are organophosphate nerve agents. They were reportedly developed in Russia from the 1970s onwards. Novichok agents are supposedly 5 to 8 times more deadly than VX, another deadly nerve agent.



Novichok agents can be delivered as a liquid, fine powder, or gas. It has been claimed that safer precursors can be mixed to make them on demand, though this has been refuted by other sources.

POTENTIAL STRUCTURES OF NOVICHOK AGENTS



Exact structures of Novichok agents are unknown. The structures above are those suggested by Vil Mirzayanov, the Russian chemical weapons scientist who exposed their development. Nerve agent exposure is usually treated with atropine and pralidoxime.

EFFECTS OF NOVICHOK AGENTS



Stop breakdown of acetylcholine



Cause contraction of the pupils



Excessive mucus, tears, saliva & sweat



Nausea, gastrointestinal pain & vomiting



Bronchoconstriction & chest tightness



Spasms, convulsions & loss of bowel control



Coma & eventual death



© Andy Brunning/Compound Interest 2018 - www.compoundchem.com | Twitter: @compoundchem | FB: www.facebook.com/compoundchem
This graphic is shared under a Creative Commons Attribution-NonCommercial-NoDerivatives licence.



Ukraine

Russia has destroyed declared stockpiles of nerve agents but is known to have active CW program.

Recent use of Novichok agents etc shows Russia not afraid to break international conventions.

Capability for broad civilian attacks unlikely; strategic need not identified; would CW attack trump known atrocities and war crimes?

Threats focused on chemical (and nuclear) plants.

Arms Control Association

Timeline of Chemical and Biological Weapons Developments During Russia's 2022 Invasion of Ukraine

May 30: Ukraine submitted a letter to the OPCW alleging that on May 30, Russian troops shelled an ammonia pipeline “Togliatti – Odesa” in the Bakhmut district, Donetsk region. The letter also claimed that, as a result of the alleged shelling, there was an ammonia leak which caused a toxic cloud that moved over several nearby villages. There were no casualties reported. (See [Ukraine: 30 May 2022 – NV_61219/35-196/50-36735](#) of OPCW document).

May 31: Russia refuted Ukrainian claims that Russian shelling struck an ammonia pipeline at the Odessa Port Plant in a letter to the OPCW (see [Russian Federation: 31 May 2022 – NV_25](#) of OPCW document).

May 31: In a note to the OPCW, Ukraine alleged that “on the 31 of May at 06:45 pm the Russian military targeted the large-scale chemical industry complex ‘Azot’ in order to create chemical pollution” (see [Ukraine: 31 May 2022 – NV_51219/35-196/50-37431](#) of OPCW document). The letter also alleged that a railway tank containing nitric acid was damaged, causing the release of a cloud of toxic chemicals. No casualties were reported.

June 1: The British Embassy in the Netherlands submitted a note to the OPCW condemning Russia’s allegations about chemical weapons provocations being prepared in Ukraine (see [United Kingdom: 1 June 2022 – NV_63/2022](#) of OPCW document).

June 1: Responding to the Ukrainian allegations regarding the chemical industry complex “Azot” (see May 31), Russia submitted a letter to the OPCW claiming that, “as early as on 6 May 2022, the Ministry of Defence of the Russian Federation warned about the provocation at the ‘Azot’ plant in the city of Severodonetsk, in the People’s Republic of Lugansk, being prepared by Ukrainian nationalists planting bombs on containers holding hazardous chemicals” (see [Russian Federation: 1 June 2022 – NV_26](#) of OPCW document).

June 6: Russia submitted a note to the OPCW alleging that, “the Kiev authorities, having recognised that it is not possible to continue to resist and hold the industrial zone in the city of Severodonetsk, in the People’s Republic of Lugansk, have instructed a composite task group (the surviving contingent of 2 the 79th detached air assault brigade of the Ukrainian Armed Forces, the 117th and 118th detached battalions, and the 111th detached territorial defence brigade) to plant explosives on containers of the Severodonetsk enterprise “Azot” holding nitrate and nitric acid, the total amount of which exceeds 100 tonnes” (see [Russian Federation: 6 June 2022 – NV_27](#) in OPCW document).

June 9: Russia submitted another note to the OPCW accusing Ukraine of preparing a chemical false flag incident (see [Russian Federation: 9 June 2022 – NV-29](#) of OPCW document). Russia went on to allege that, should a provocation take place, the OPCW will use the provocation to accuse Russia of using chemical weapons.