

Toxic chemicals and evolving challenges of misuse

Dr Jean Pascal Zanders

The Trench

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How do you understand chemical warfare?

Is the following chemical warfare?

- The shelling or bombing of a military position with phosgene or mustard agent?
- Police using a lachrymatory agent (tear gas) to disperse demonstrators?
- The assassination of an individual with a poisonous substance?
- Shelling of a chemical factory?
- Dropping barrels filled with chlorine on destroyed houses?
- Releasing a toxic substance from a storage tank into a river during an industrial strike?
- Specialist military forces using lachrymatory agents against enemy troops hiding in houses or tunnels?
- Shelling of freight wagons filled with chlorine?
- Releasing a malodorant (stink bomb) in a theatre to protest a play?
- Injection of a toxic substance to execute a convict?

Challenges to your understanding

- Two key concepts
 - 'Chemical'
 - 'Warfare'
- What we had in the sets of questions
 - Use of a toxic chemical
 - Different contexts of usage, different types of agents, and different volumes of agent
 - Battlefield use
 - Terrorist actions
 - Individual assassination
 - Industrial or economic sabotage
 - Law enforcement
- Looking at the '*use of chemical weapons (CW)*' versus '*chemical warfare*'
 - Knowing the different contexts and circumstances is critical to understanding the chemical 'threat'

What is CW use?

Intentional application for *hostile* purposes of *toxic* substances against humans, animals and their environment

- *Blood agents*: prevention of oxygen transfer to tissues (e.g. phosgene)
- *Choking agents*: interfere with breathing (e.g. chlorine)
- *Nerve agents*: attack the central nervous system (e.g. sarin)
- *Vesicants*: produce blisters (e.g. mustard agents)

- *Central Nervous System-acting agents (incapacitating agents)*: induce temporary physical disability or mental disorientation (e.g. LSD, BZ, Fentanyl + many new developments)
- *Irritating agents*: induce 'short-term' irritation (e.g. tear gas)
- *Anti-plant agents*: herbicides, growth inhibitors, etc.

The CBW threat spectrum

- War scenarios
 - Terrorism and political violence
 - Assassinations
 - Criminal acts
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- Each will consider and have the availability of different CB agents, with different degrees of pathogenicity or toxicity
 - Depends on *intent*
 - Depends on *availability*
 - Depends on *technical skills* and *structure* of the organisation

Alternative uses of chemical agents

- **Against humans**
 - Potential for mass casualties exists, but not necessarily most likely scenario as agents difficult to acquire
 - Incapacitation
 - Wider range of agents available
 - Easier to collect from nature and cultivate
 - Delivery uncomplicated
 - Lower requirements for skills and functional specialisation
- **Against animals and plants**
 - Economic impact
 - Agents easier to acquire; less of a risk to perpetrator
 - Easy to deploy
 - Many vulnerabilities in the food chain
- **Economic and societal disruption**
 - Goal is to disrupt functioning of utilities, commercial enterprises, public agencies
 - Wider range of CB agents available
 - Several can be commercially obtained
 - Exploitation of fear and lack of adequate preparations
 - Effectiveness of hoaxes
- **Assassinations**
 - State-sponsored
 - Terrorist
 - Criminal

Opportunistic use of toxic agents

- **Use of any available toxic chemical**
 - Stores at industrial plants, water purification facilities, etc.
 - Toxic substances may be used in agriculture (pesticides, insecticides, herbicides & other anti-plant chemicals)
- **Core characteristics:**
 - No development or production of the agent by the user
 - Attacks will cease after available stores have been depleted
 - Only development may be in area of delivery system
- **Examples:**
 - *Sri Lanka*: Tamil Tigers – chlorine from paper mill after munition ran out (1990)
 - *Iraq*: al Qaeda in Iraq (AQI) – chlorine in truck bombing campaign (2006-07)
 - *Iraq and Syria*: Islamic State in Iraq and the Levant (ISIL) – chlorine in mortar bombs and improvised explosive devices (IEDs) (2014 - 17)
- **Cases are rather use of CW as a method of warfare by non-state actor than terrorism**

CW concept is changing fast

- Until end of Cold War: vast arsenals counted in *tens of thousands* of metric tonnes (mt)
- Iran – Iraq war (1980 – 88): arsenals counted in *thousands* of mt
- Syria civil war (2011 -): arsenal counted in *hundreds* of mt
- Terrorist use: *kilogramme* amounts at most
- Assassinations: *grammes / milligrammes*

A final thought: From chlorine to chlorine

- Have chemical weapons come full circle after 100 years?
 - 22 April 1915: chlorine release at Langemark near Ypres
 - 2014 – 18: reported use of chlorine as a weapon in Syria & Iraq
- Where is the progress?
 - In 1915: chlorine as a CW = high technology
 - ± 160 tonnes released over a 7km front
 - ± 600 tonnes produced for a CW campaign
 - Today: chlorine is a banal industrial commodity
 - Annual global production is > 60mn tonnes
- Paradox: return to chlorine can be viewed an expression of the success of the *Chemical Weapons Convention*, as more potent agents are now banished



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www.the-trench.org

E-mail: jpzanders@the-trench.org

Twitter: [@JPZanders](https://twitter.com/JPZanders)

Blog: <http://www.the-trench.org/blog/>