



Chemical IEDs

Current status and Trend Threat



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1. Introduction

Chemical Weapons (CW) are not a new threat the international community has to cope with. In the past there had been infamous cases of countries using these types of Weapons of Mass Destruction (WMD). From the First World War through the Second World War just to recent times as proved in Syria.

May be the new challenge regarding chemical weapons is the change of users. Therefore, we can state that in the past chemical agents were or could only be used by Nations or “officials hands”. Nevertheless, currently the threat is uncertain and there are real concerns about new threats from non-state actors or violent extremist organizations (VEO) using this type of unconventional weapon.

In 1997 the Chemical Weapons Convention (CWC) entered into force in an attempt to reduce the risk of employment of these weapons in conflicts. 192 nations are State Parties of the CWC, leaving four nations outside of this international treaty: Egypt, Israel, North Korea and South Sudan. Syria joined the CWC on September 2013, after numerous episodes of chemical agent employment during the civil war started in 2011 as a consequence of the Arab Spring.

Currently the problem has become more complex. The combination of an IED with chemical enhancement is a threat terrorists are trying to develop. This combination is not easy to carry out and there are some technical issues to overcome before rendering it as an efficient weapon capable to provoke a high amount of casualties.

Even though NATO troops can be considered as highly prepared to face chemical attacks, the use of these weapons would provoke an undeniable hysteria effect among the population. Therefore there is reasonable value on developing a chemical IED. In this vein it could be stated that they are not used as WMD but used as a psychological weapon.

This product based in open sources aims to present a general approach to the use of chemical IEDs taking into account recent incidents using chemical agents as a filler or enhancement to an IED. Through analysis of these incidents we will try to identify new trends or tactics, techniques and procedures (TTPs) on the use of them by terrorist organizations.

2. Difference between Chemical Weapon (CW) and Chemical IED.

Although there are great similarities between a chemical weapon and a chemical IED this is important to set up the difference.

A CW is a manufactured standardized munition such as an artillery projectile. It is designed for the utmost efficacy of the chemical agent and therefore the way of delivering it to the objective is conceived and engineered to this purpose.

Nevertheless, a chemical IED, takes advantage of the IED to deliver the agent and therefore the efficacy is not assured as this is not a suitable method designed for this purpose. Consequently and fortunately the effectiveness of the agent is jeopardized.

3. Chemical Weapon Agent (CWA) and Toxic Industrial Material (TIM)

A Chemical Weapon Agent (CWA) or Chemical Agent (CA) is defined as a chemical substance which is intended for use in military operations to kill, seriously injure, or incapacitate man through its physiological effects. Mustard gas, nerve agents (sarin, VX) can be clear examples of CWA.

On the other hand, a Toxic Industrial Material (TIM) is a generic term for toxic or radioactive substances in solid, liquid, aerosolized or gaseous form that can provoke similar effects as CWAs. These may be used or stored for use, for industrial, commercial, medical or domestic purposes. TIM may be chemical, biological or radioactive and described as toxic industrial chemicals (TICs), toxic industrial biologicals (TIBs) or toxic industrial radiologicals (TIRs).

Nevertheless, according to the CWC, any TIC can be considered a chemical weapon if it is designed or used for military purposes. In the past, much of the CWA consisted of TIC (chlorine, phosgene, hydrogen cyanide, etc.).

4. Chemical and Chemical-IED attacks.

In this report not only Chemical IED events are related but also chemical attacks, as it is considered that presenting some background on chemical agents is important to understand the chemical IED threat.

4.1 Japan

In 1995 a chemical attack using sarin, a nerve chemical warfare agent, was inflicted by Aum Shinrikyo religious sect in the Tokyo subway. Terrorists killed 13 people and wound 6.000. In five coordinated attacks perpetrators released sarin on several lines of the Tokyo subway during the rush hour. This incident marked the first time that such a large number of people were exposed to a nerve agent in a terrorist attack.

Sarin is the most volatile of the nerve agents that means that when in liquid form, it easily evaporates into vapor and spreads into the environment. Because it evaporates so quickly, sarin presents an immediate but short-lived threat.

Although it was not a chemical IED event we could state that it was the most important chemical attack accomplished by terrorists and therefore it is necessary to outline and raise attention to the fact that it was the first time sarin was employed by “non-official hands”.

4.2 Syria

Syria has become a real concern since the war exploded in 2011. The fact that the Bashar Al Asad regime did not sign the CWC until 2013 raises confusion on how many and where are the different stocks of CW. Syria reportedly possess stocks of sarin and mustard chemical warfare agents and the use of these agents has been proved in several awful attacks against civilian people, each side, rebels and regime, blaming each other on the use of them.

More fears arise about the possibility of Syrian uncontrolled stocks changing hands and the unpredictable consequences if ISIL were to access them. Not only ISIL could employ them for war purposes but also to export them in vicinity countries such as Iraq, Israel or even western countries, where, these weapons could raise more and more alarm and worries.

4.2.1 Chemical Agents in Syria: mustard gas, chlorine, sarin and pesticides.

It has been proved in Syria that chemical weapons have been used at least on three occasions: Homs on 23th December 2012 and Khal Al-Assal and in Ataybah on 19th March 2013. Recently, chlorine attacks have been also testified in March 2015 and September 2016. There have been also some attacks against Kurdish troops showing the use of mustard gas by ISIL.

In addition, the use of sarin has been proved after environmental samples were analyzed by the United Nations. Based on different reports, there were about 1400 deaths and 3000 wounded people after the attack in Ghouta, Damascus on August 2013. Although is it not clear which organization or group committed the attack, the chemical agent was delivered via indirect rocket fire, indicating that the Syrian regime was responsible.

On the other hand, there is clear evidence that rebels or VEO in Syria were attempting to employ pesticides as chemical agents. For instance, in September 2014, Asad regime forces confiscated tubes of pesticide containing aluminum phosphide, the precursor agent to create phosphine gas. The material was seized by rebels in the city of Tadmur at the Yarmouk refugee camp and was destined to be deployed against the regime. According to Syrian security forces, the material was destined for use as CW filler for improvised grenades or another form of CW attack.

Therefore it seems that the potential use of pesticides as “poor man's chemical weapons” is already increasing at rebels’ side.



Phostoxin tubes seized from Syrian rebels by regime forces on September 2013

4.2.2 Improvised Rocket-Assisted Mortars (IRAMs):

In August 2013, Syrian opposition sources published evidence of improvised rocket assisted mortars (IRAMs) at the scenes of alleged Syrian Arab Army (SAA) chemical attacks in the Damascus countryside, in Saqba, Ein Tarma and Adra.

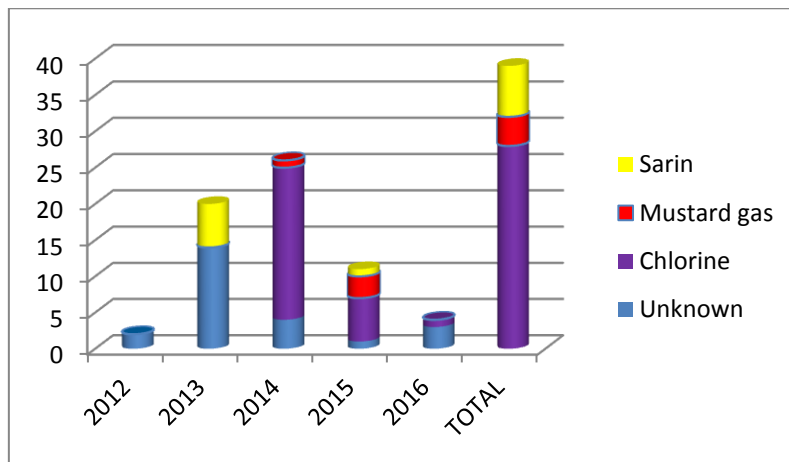
The scene and IRAM remnants in Adra suggest that IRAM main-charge may have included a CW or toxic industrial chemical (TIC) enhancement.



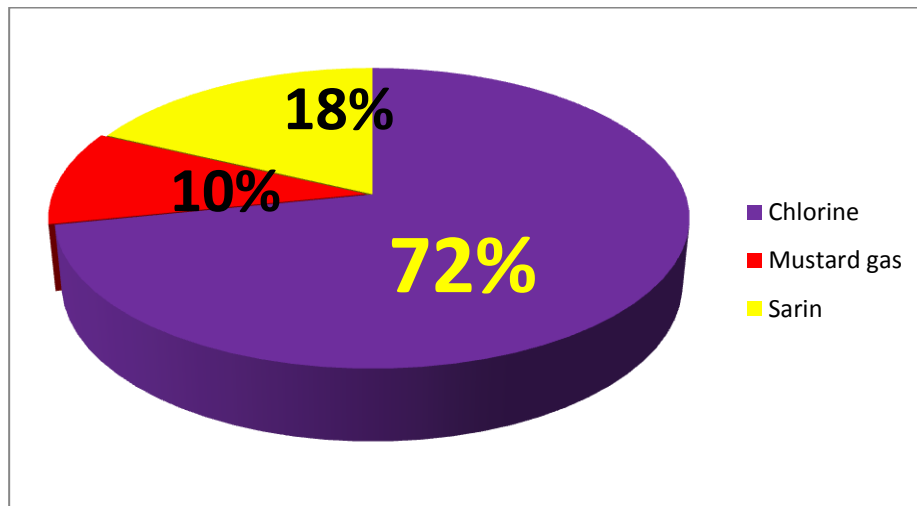
It is to mention that IRAMs were previously used in Baghdad, Iraq, in November 2007 against U.S. forces. So, this is a clear example of TTP migration from one country to another.

4.2.3 Statistics.

The following are statistics about the number of attacks committed in Syria from 2012 to 2016 classified by chemical agent and percentage. It is clear that the toxic industrial chemical (TIC) chlorine is the most common (72%).



NUMBER OF ATTACKS BY CHEMICAL AGENT AND YEAR IN SYRIA



PERCENTAGE OF ATTACKS BY CHEMICAL AGENT IN SYRIA

4.3 Iraq

4.3.1 Chlorine bombs attacks:

The vast majority of chemical attacks committed in Iraq are chemical IEDs based on chlorine gas used either by ISIL or AQ.

The first open source documented use of chlorine was during the Iraq War in October 2006 in Ramadi, Al-Anbar Governorate. An armored dump truck SVBIED was documented containing two cylinders of chlorine and 120 mm mortar rounds were initiated, resulting in four casualties.

Between October 2006 and June 2007, Iraq witnessed 15 truck VBIED attacks against Coalition forces, mostly comprising cylinders of chlorine as part of the main charge.



Chlorine tanker VBIED, north of Baghdad, February 2007



Truck VBIED packed with barrels of chlorine seized in Ramadi, March 2007

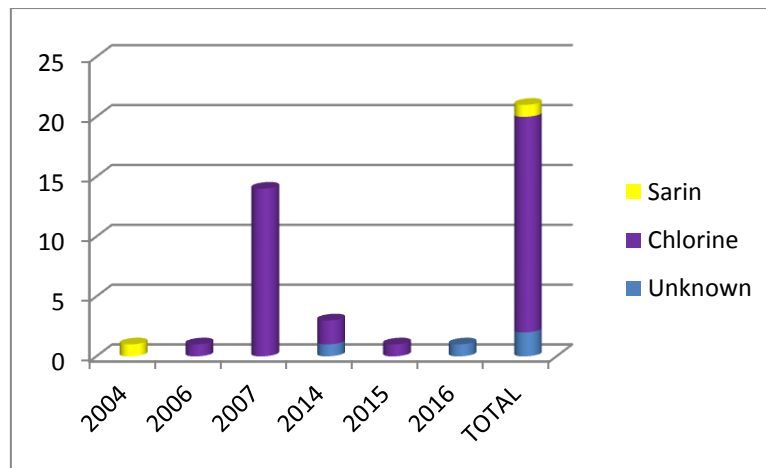
In January 2015, Kurdish Peshmerga fighters claimed to have identified a truck SVBIED travelling on the road between Mosul and the Syrian border. They reported that the SVBIED contained about 20 cylinders (precise quantity unknown) of chlorine and the initiation system was rigged to be operated by a suicide bomber. The truck SVBIED initiated when the Peshmerga forces opened fire on it.



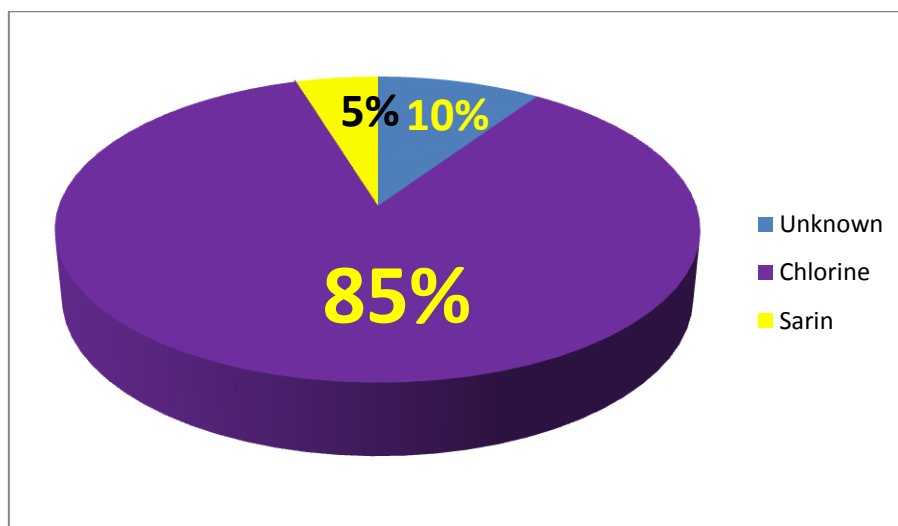
Truck SVBIED destroyed by Peshmerga fire, January 2015

4.3.2 Statistics:

The following are statistics about the number of attacks committed in Iraq from 2004 to 2016 classified by chemical agent and percentage. As in Syria, it is to notice that chlorine is used in the vast majority of attacks (85%). Apparently, there have not been any attacks with mustard gas in Iraq.



NUMBER OF ATTACKS BY CHEMICAL AGENT AND YEAR IN IRAQ



PERCENTAGE OF ATTACKS BY CHEMICAL AGENT IN IRAQ

4.4 Indonesia

In February 2015 an IED with a chlorine enhancement was placed in a shopping mall in Jakarta. Fortunately the device did not detonate so no casualties were inflicted. Indonesian terrorists believed to have returned from fighting with the Islamic State in Syria are suspected of being behind the event. This is the clear evidence that ISIL is exporting know-how on chemical IEDs.



Chemical IED found in Jakarta

As a chemical IED is not the best way to deliver a TIC to produce great amount of casualties, it is assessed that the main goal of the intended attack was to produce a psychological effect rather than casualties. On the other hand, as the target was a shopping mall the intention may have been was probably to produce a negative impact on the economy taking advantage of the psychological effect produced and therefore raising fears on populace going shopping.

4.5 Colombia

Between 2001 and 2007 there have been three different related chemical IED events in Colombia:

- September 2001, the Colombian police accused the Revolutionary Armed Forces of Colombia (FARC) of using improvised grenades filled with poisonous gas during an attack.
- May 2004, 800 bullets were seized soaked in liquid cyanide after clashes with leftist rebels in northeast Colombia.
- November 2007, the Colombian police found rockets filled with chemical components as chlorine, ammoniac and cyanide substances in FARC's clandestine weaponry workshop near Ecuador border.

Since 2007, no more chemical IED events have taken place in Colombia and this tendency will likely remain in the future due to the recent peace agreement between the Colombian government and the FARC.

5. Chemical Agent combined with IED.

It could be stated that some extremist organizations could have in their hands the raw material to develop chemical weapons but, fortunately, the combination of an IED with a chemical agent, usually do not have a high degree of lethality. The reasons are very simple, on the one hand, the fact that the high temperature the ignition creates results generally on the neutralization or the uselessness of the gas or liquid toxicity. On the other hand, a bomb is not the best diffuser to deliver the product to the atmosphere.

In the case of chlorine being used in IEDs the following considerations must have to be taken under consideration: chlorine is a heavy and volatile gas. To suffocate a victim, the gas must be administered in a highly concentrated form over a minimum period of time. When a chemical-based IED is initiated, the container is breached and the heat consumes some of the chemical content. The amount of the chemical agent consumed in the blast increases in accordance with the size of the explosive charge. For this reason, chemical weapons typically utilize the minimum amount of explosive necessary to rupture the container and to disperse the gas.

Those facts lead the chemical IED to be feared but not by its lethality as weapons of mass destruction (WMD) but for its psychological impact on the population targeted. The aim is not only to cause physical casualties but also to demoralize and to create panic and fear. Therefore while they do fit the current legal standard for being considered as WMD they should more probably be classified as weapons of mass hysteria or weapons of mass disruption. The concentration of these industrial gasses necessary to kill is relatively high and hard to achieve over any substantial area with these types of weapons. A limited number of people could certainly be killed by these weapons, but the hysteria resulting from their use would be much more devastating in both the long run and short run than would be the actual injuries from the chemicals.

6. Different ways to disperse a chemical agent.

There are different ways to create a chemical IED, it depends basically in two different aspects: the agent used and the way to disperse it. The agent can be more or less lethal but the real factor that gives efficiency to the attack is the manner the agent is delivered.

There are basically four different ways to deliver a chemical agent:

1. Improvised Explosive Device: an IED always has a notorious impact due to its own nature. Adding a chemical component to the explosion may add more panic, notoriety and fear to the event. Fortunately, as explained before, the explosion reduces the efficiency. As a result, high fear provoking effect but low chemical efficiency.
2. Binary Device: easy manufacturing and widely spread on internet makes it to become the last tendency. It has been used in Iraq and Afghanistan. Some are known as “Mubtakar” and consists of two separate containers containing Potassium Cyanide and Sulfuric Acid. Mixing these precursors results in Hydrogen Cyanide.

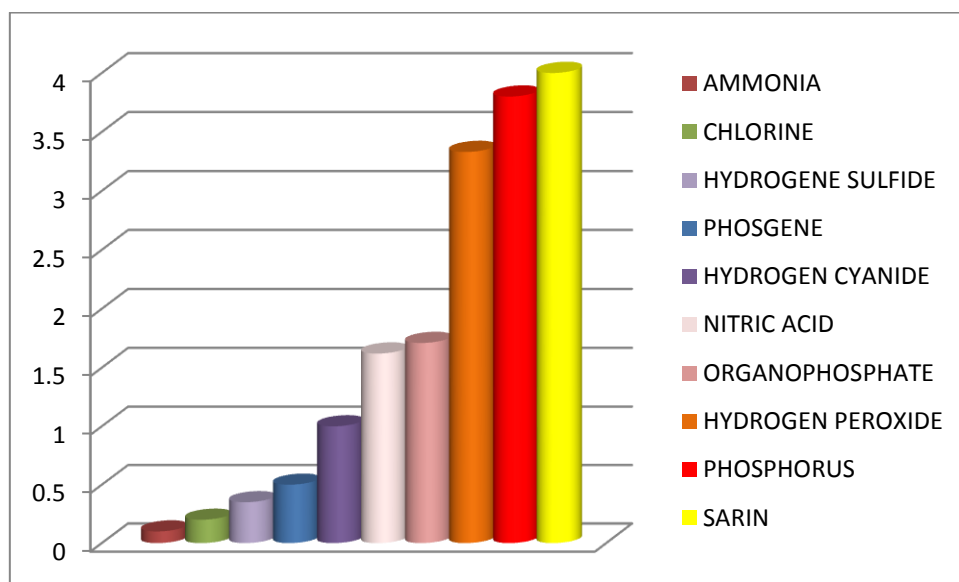
The “Mubtakar” is easy to create, easy to transport in a bag or box and is widely published on terrorist sites. The main disadvantage is that it is only efficient in confined and relative small places. Some examples of “Mubtakar” use are related as follows:

- The May 1995 Aum Shinrikyo cult attempted to achieve a hydrogen cyanide attack in the Tokyo Shinjuku subway station, using a device to react a bag of diluted sulfuric acid with a bag of powdered sodium cyanide.
 - Another alleged attack attempted by this cult in the Kayabacho Tokyo subway station was foiled when a timed device containing the same chemical was discovered.
 - In 2003, an Al-Qaeda plot to release cyanide gas into the New York City subway system was also thwarted. The plan involved the use of a “Mubtakar”.
3. Sprayer: the sprayer is the most effective way to deliver a chemical agent and may be the cheapest and simple. The wind direction is a key factor and difficult to control. Some previous study is needed in order to know the elements of the area that can influence the release, the suitable altitude and the wind force and direction. Therefore great expertise is needed to get the lethal effect desired. On the other hand, there is no “spectacular” effect as in the combination with an IED detonation.
 4. Indirect fire: manufacturing an improvised mortar bomb or rocket as a tool to deliver a chemical agent is not easy. There are physical effects that must be taken into account as stability in flight and the exact amount of explosive to deliver the agent without consuming it in the blast. Generally, the agent is a liquid mixture that difficult the accuracy of the flight and therefore

erratic trajectories are performed. The accurate amount of explosive in order to allow for an extensive spread without firing the chemical shows that this is not an easy device to manufacture without some technology and expertise.

7. CWA Lethality:

Below is a scale of 8 different high hazard chemicals considered lethal in small doses. Those agents are referenced to the benchmark of Hydrogen Cyanide (which is exceptionally harmful) at the concentration of 250 ppm (parts per million). For instance, at the same concentration, Sarin is four times more lethal than Hydrogen Cyanide.



CHEMICALS LETHALITY SCALE

8. ISIL capability to produce CWA:

ISIL capability to produce chemical agents still remains a concern. As seen in the past there have been some attempts to produce chemical agents by other terrorist organizations such as Al Qaeda. For instance in 2002, Abu Musab al-Zarqawi the leader of Al Qaeda in Iraq (AQI) allegedly was attempting to produce ricin and topical poison in Northern Iraq probably to be used in terror attacks on the US and Western Europe.

Nevertheless, regarding the capability to produce nerve agents, and due to the complexity and necessity of high qualified CW experts to produce them, it is highly improbable that ISIL would have access to produce it. Besides, chemicals precursors to stabilize the agent avoiding degradation and short shelf life are difficult to obtain. High expertise and high technology production equipment are needed. Those facts lead to think that the probability to create sarin gas or VX by extremists is very low. As such, in the Tokyo sarin attack, even with reasonable good financing budgets and good expertise it was demonstrated that the lack of purity of the sarin employed and some difficulties in the delivering method rendered the attack less lethal than expected.

On the contrary, ISIL is believed to have created limited amounts of mustard gas. In its pure state, mustard agent is colorless and almost odorless but reported chemical attacks committed by ISIL in Syria have shown the presence of dark yellow gas with strong smell of mustard, onions, or garlic which is an indicator of impure agent. So, this is the evidence that ISIL has the capability to produce mustard gas, not very toxic as it is not pure agent, but with a huge psychological impact.

9. Assessment:

As reported in this document a chemical IED is a weapon with relative capability to inflict great amount of casualties. Nevertheless and due to the fact that the use of these weapons causes an undeniable hysteria effect among population there is reasonable value on developing them as psychological weapons.

Syria remains the real concern. There have been numerous attacks with chlorine, mustard and sarin and there has been much confusion on responsibility, being it, the regime, ISIL or other extremist groups. This fact added to the CW stocks security issue can lead us to think that ISIL have effectively seized relative amounts of CW and therefore they are using them directly, providing they have suitable means to launch them, or combined with IEDs thus rendering the agent less effective. Furthermore, the "Organization for the Prohibition of Chemical Weapons" (OPCW) stated some inconsistencies in the number of stocks declared by the Syrian regime, so there is a risk of some Syrian chemical weapon stocks being under non-state hands control.

Additionally, it seems ISIL have developed some capability to produce homemade mustard gas which should raise some concerns and must be considered as a step forward on the manufacturing of chemical agents. Nevertheless, it seems they have not reached the capability to produce sarin gas or nerve agents as it is difficult to synthesize and too much expertise and high technology equipment is needed.

In Iraq, on the contrary, it seems that the situation is different as the vast majority of attacks are based on chlorine. The most common TTP used is the VBIED (armored trucks charged with chlorine barrels). Probably this is clear evidence that they do not have access to more toxic agents.

So, at the end, there are two remarkable points to highlight. First, the fact that chlorine remains the most used chemical agent in chemical IEDs, probably, because chlorine is cheap and relatively easy to acquire and second, the fact that Syria is becoming the breeding ground for chemical terrorism as it is a chemical hot spot with uncontrolled CW stocks. This means that ISIL is gaining more and more experience and know-how on chemicals agents employment which could have consequences on an increasingly threat on chemical attacks in Western countries.

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