

# COMMENT



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A Russian defence unit practises rescue training after a simulated chemical attack in 2002.

## Update the Chemical Weapons Convention

Bring biological threats into the treaty and make chemists more aware of the dark side of their research, says **Leiv K. Sydnes**.

From 8–19 April, representatives of the 188 nations that signed and ratified the Chemical Weapons Convention (CWC) will meet in The Hague, the Netherlands, to review the treaty for the third time. The documents at the heart of the discussions bear good news about progress against the threat of chemical warfare. But they do not address recent geopolitical changes or emerging small-scale production technologies that pose new risks.

Analyses from the past five years will show that the Organisation for the Prohibition of

Chemical Weapons (OPCW) has done an outstanding job. About 78% of the declared chemical-weapons stockpile has been destroyed, and this is expected to rise to 99% by 2017. The reports will also show that all known chemical-weapons production facilities have been deactivated or converted for peaceful purposes. And they will state that scientific and technological developments have been evolutionary, not dramatic, with little impact on the production and use of chemical weapons.

But what will be missing is a crisp

assessment of how major geopolitical changes have altered the world that the CWC and OPCW were created to serve. The CWC is an agreement between states, as these were the political players of the past. But major conflicts today involve a few countries that have not signed the convention, and some small, militant groups with political objectives but no legal standing. Syria, for example — one of six countries that has neither signed nor acceded to the CWC — is said to have chemical weapons. This undermines the authority of the convention. ▶

► New chemical processing techniques and equipment, including compact reactors, mean that terrorists can make small but deadly quantities of chemical weapons beyond the reach of the convention. Toxic compounds can also be synthesized using biological processes, which are not controlled.

These facts call for two science-based actions: inspection of biotech industries, and thorough analysis of data showing sales of chemicals and reactor technology. To achieve this, we should rethink the CWC and merge it with the Biological and Toxin Weapons Convention (BWC). An updated convention needs a broader remit if it is to limit the re-emergence of chemical weapons in any form and any amount, anywhere.



Industrial plants in Syria are outside the remit of the Chemical Weapons Convention.

### LIMITED SCOPE

Conferences take place every five years to evaluate the operation of the CWC treaty, assess progress and decide whether modifications are needed. So far, few changes have been made. The signatory countries have been concerned with chemical warfare on a massive scale, such as the Iran–Iraq war (1980–88). The regulations and inspection regimes focus on certain types of chemicals owned by states in large quantities — both chemical weapons, such as sarin and mustard gas, and the chemicals, including phosgene (carbonyl dichloride) and thionyl chloride, that are used to prepare them.

Geopolitical changes affect the CWC because it deals only with national authorities and not with the powerful individuals, revolutionary groups, factions in civil wars and terrorist cells that can exert a detrimental influence on global security. The number of non-state political actors has grown as a result of regional conflicts, increasing terrorism and the collapse of national structures. The CWC does not give the OPCW any authority to act in conflicts between such parties. This does not prevent the destruction of existing chemical weapons, but it could pose serious problems in the future.

The small-scale production of chemical weapons by activists and terrorists is also beyond the scope of the CWC, and these risks are growing. Advances in three areas must be watched carefully.

First, closer surveillance is needed of chemistry that overlaps with medicine and biology, such as research on neuropeptides and bioregulators — an area that is growing rapidly and paves the way for synthetic biology and the large-scale production of toxins. Examples are saxitoxin (a paralytic

neurotoxin) and ricin (an inhibitor of protein production), which are prohibited by both the BWC and the CWC. It therefore makes sense to merge the two conventions and introduce the CWC inspection regime to the biological sciences. This will have a significant impact because the BWC does not authorize inspections.

A second area for scrutiny is research on incapacitating chemical agents (ICAs) — compounds that act on the central nervous system but are meant for crowd control, rather than warfare<sup>1</sup>. Such work is currently allowed under the CWC, but I agree with international security expert Malcolm Dando of the University of Bradford, UK, that it should be prohibited<sup>2</sup>. Compounds such as fentanyl derivatives and other opioids are deadly to some people but not to others, depending on gender, age and general health. When some 750 hostages were exposed to a fentanyl derivative in a Moscow theatre in 2002, for example, about 125 people died. Other deadly ICA compounds will inevitably be produced in the search for a safe agent for riot control.

Third, flow microreactors must be tracked because they make it relatively safe to produce toxic compounds, as only small amounts of products are present in the reactor at any given time. Microreactors have become widespread because they are robust and easy to use, making it quick and easy to set up and dismantle a small chemical-weapons facility. The OPCW should consider holding a register of microreactor buyers.

Information and people are both spread more widely than five years ago. The scientific literature is accessible anywhere with adequate computer facilities, and can be searched quickly and thoroughly. With procedures and

starting materials so readily available, almost anyone can try to make a chemical weapon.

Many students are educated in several different countries and become involved in multinational research projects. Researchers travel to lecture, to discuss and build networks, and to participate in virtual education. This mobility increases the likelihood that individuals with a university education in chemistry will be exposed to political ideas that lead them to commit terrorist acts. Indeed, at least one of the terrorists behind the London bombing in 2005 had some education in chemistry.

### CODE OF CONDUCT

Chemistry cannot be blamed for chemical warfare or terrorism, but the chemistry community has a duty to be aware

of the danger and to act to prevent the misuse of chemicals. We must work to educate people about chemical safety, waste disposal and the responsible use of chemicals, starting at school. We need university courses on chemical weapons, and I welcome initiatives by the OPCW and several non-governmental organizations, including the International Union of Pure and Applied Chemistry, to provide materials for these.

Awareness also has an ethical dimension. The OPCW is among those who have tried to compose a code of conduct for chemists, but so far no document has emerged. Some say that the civilian and military dual use of chemicals makes it almost impossible to agree on a short and precise wording. Others argue that signing a code means nothing if you are inclined to violate the CWC.

I would like to see a code of conduct. I think that signing up to such a code would force chemists to reflect on the gravity of their work, increasing their levels of responsibility and awareness. This, a strong OPCW and a new Biological and Chemical Weapons Convention are the best ways to prevent the use of these terrible weapons. ■

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