

SwedenWorking paper on toxicity criteria for "Key CW precursors"

The possible future production of chemical weapons by the "binary technique" will make it necessary to clarify and define some concepts e.g. "precursor". It will also be necessary to find toxicity criteria for "binary chemical weapons" and for their main constituents in order to classify and include them in a future convention for prohibition of CW-agents.

During the consultations with delegations, assisted by experts, held by the Chairman of the Working Group for Chemical Weapons regarding standardized toxicity determinations during the CD spring session 1982, the Swedish delegation presented a paper entitled: The concept "precursor" and a suggestion for definition for the purpose of a Chemical Weapons Convention (CD/CW/CTC/4). A revised version of this working paper in which points of view raised by other delegations during the spring session 1982 have been taken into account, was presented later (CD/277, 7 April 1982).

Some chemicals used in a chemical synthesis of a CW-agent are more important than others for the result of the synthesis. For such a chemical the term "key CW precursors" was suggested and defined as follows (CD/277).

"Key CW precursor" is the starting reactant in a one pot chemical synthesis forming a super-toxic lethal, other lethal, or other harmful chemical, which determines the main characteristics (class of compound, toxicity etc.) of the chemical formed when the reaction is taking place:

1. In a chemical weapon warhead or other disseminating device for chemical weapons, immediately before the dissemination of the final, toxic product, i.e. the chemical warfare agent;
2. In a production facility producing super-toxic lethal, other lethal, or other harmful chemicals.

It appears not to be very useful to apply toxicity criteria to "key CW precursors" themselves in a future CW convention. Preferably purpose and quantity criteria could be used to classify "key CW precursors" as suggested in CD/277. The nature of the "key CW precursor" is decisive for the resulting CW end product(s) of a certain chemical reaction. However, the toxicity of the "key CW precursor" need not be related to the toxicity of the end product(s) in that chemical reaction. Therefore, the toxicity criteria will have to be applied to the main end products of the "one pot synthesis" and - in order to detect any case of synergism - to mixtures of these end products.

A. For the classification of a chemical compound, suspected to be a "key CW precursor", we suggest the following test procedure.

The suspected "key CW precursor" is allowed to react with other chemical compounds, which from a theoretical point of view may give rise to a CW-agent. The (main) end products formed in this chemical reaction should be subject to qualitative as well as quantitative chemical analysis. Each of the identified (main) end products should be tested for their individual toxicity, with the exception of chemicals with a toxicity already known and documented.

The methods used to test the toxicity should be those agreed upon for CW-agents. If the result of the toxicity test shows that the toxicity of one chemical end product in the chemical reaction is such that the end product will be classified as a "super-toxic lethal chemical" (CD/220), no further toxicity test is needed.

B. However, if the toxicity test shows that the end products are less toxic, the end products will have to be tested for toxicity in a mixture. In this mixture, the quantitative proportion between the various chemicals in the mixture must be the same as the one obtained in the chemical reaction during a certain set of conditions. If the mixture, when tested for toxicity, will be classified as "super-toxic lethal chemical" no further toxicity test is needed.

C. If the mixture is less toxic, the most toxic end product should be tested for its toxicity mixed with each separate end product of the chemical reaction.

In a future convention against production, storing etc. of CW-agents, a "key CW precursor" should be treated as a "super-toxic lethal chemical", if any of the chemical end products, or if the mixture of the main end products or if the most toxic end product combined with any other less important end product(s) has a LD_{50} -value less than 0.5 mg/kg and/or a LCT_{50} -value less than 2,000 mg.min/m³.

If by means of any of the three methods mentioned above a chemical compound is found to give rise to compounds or mixtures with a higher LD_{50} and/or LCT_{50} it should be treated as "other lethal chemicals" or "other harmful chemicals" as defined in CD/112.