Tabun

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Tabun [IUPAC: Ethyl *N*,*N*-Dimethylphosphoramidocyanidate] or GA was discovered by Dr. Gerhard Schrader in 1936 and is a nerve agent of the group of G agents. It is a phosphoric ester and belongs to the group of plant protection agents.

1. Structure

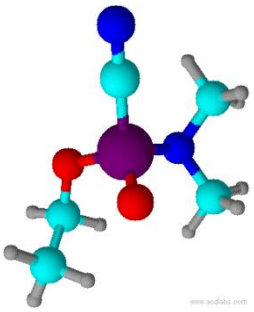

Abb. 1 Tabun in 3D-structure

Tabun is a chirales molecule and owns a stereocenter. After the Cahn-Ingold-Prelog principle exist two stereoisomers.

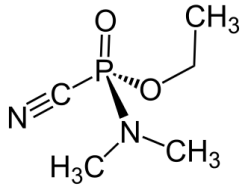

Abb. 2 (L)-Tabun in Lewis-structure

2. Properties

Tabun is a phosphoric acid ester and is one of the large group of pesticides. Tabun can dissolve well in water, is colorless and has a "fishy" odor. In the sunlight and at temperatures below 49 ° C does not break down the material. The rate of hydrolysis can be achieved by heating strongly accelerate. At 95 ° C tabun has a half-life of only ten minutes. Some decontamination can occur cyanide.

3. Physical Properties

CAS-Number:	77-81-6
Molecular formula:	$C_5H_{11}N_2O_2P$
Molar mass:	162,13g/mol
Melting point:	-48°C

Letale Dosis (LD50): 400 mg*min/m^3

Sicherheitshinweis:

R26/27/28: Very toxic by inhalation, in contact with skin and if swallowed

R40: Limited evidence of a carcinogenic effect

S13: Keep away from food, drink and animal foodstuffs.

S45: In case of accident or if you feel unwell seek medical advice immediately (show the label where possible)

4. History

Dr Gerhard Schrader who worked for I.G. Farben discovered the nerve agent Tabun in 1936. It is a phosphoric ester and belongs to the group of plant protection. Tabun is the first of the so-called G-series nerve agents along with Sarin and Soman.

During the World War II the agent was produced by the German armed forces industrially and was processed in fit ammunition like bombs and shells. All together 12,000 tonnes Tabun were produced.

Because this was never used it was sunk after the World War II, in 1949, in the North Sea and the Baltic Sea. Therefore several thousand tonnes of the dangerous

nerve agent wich resigns by the corroding ammuniation walls and damages the fish stoeks and other living beings are located infront of the German coast down in the seabed.

After the Second World War the USA and Great Britain were interested in the production and processing of Tabun in weapons-grade ammunition. Nevertheless, it was used only by Saddam Hussein against own population in Iraq war 1988.

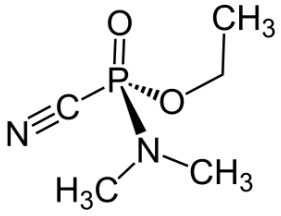

Abb. 3 (R)-Tabun in Lewis-structure

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5. Synthesis

The first step of Tabun synthesis contains of the reaction from gaseous dimethylamine with phosphoryl chloride. The resulting dimethylamidophosphoric dichloride reacts with an excess of sodium cyanide, in dry chlorobenzen, to dimethylamidophosphoric dicyanide. Atnthe last step absolute ethanol is added and the product Tabun is formed.

6.Actinism & Precaution

Due to phosphorylation of serin of acetylcholine esterase in the active site the enzyme gets inhibited.

Consequences: Acetycholine, that is attached to the postsynaptical AChE-receptors, cannot be removed. This results in a permanent excitation that finally causes death by respiratory paralysis.

7. References

Quellen:
[A] http://de.wikipedia.org/wiki/Tabun (19. Januar 2012)
[B] http://www.chemryb.at/gvw/texte/chemie_kampfstoffe.htm (19. Januar 2012)
[C] http://en.wikipedia.org/wiki/Tabun_%28nerve_agent%29 (19. Januar 2012)
[E]http://www.noblis.org/MissionAreas/nsi/BackgroundonChemicalWarfare/MaterialSafetyDataSheets_MSDS_forChemicalAgents/Documents/gaMSDSDec2004.pdf (08. Januar 2012)
[F]http://www.chemgapedia.de/vsengine/tra/vsc/de/ch/8/bc/tra/biokat_basic.tra/Vlu/vsc/de/ch/8/bc/vlu/biokatalyse_enzyme/acetylcholinesterase.vlu/Page/vsc/de/ch/8/bc/biokatalyse/ache_7.vscml.html (25.01.2012)
[G]http://www.gifte.de/B-%20und%20C-Waffen/tabun.htm

8. Addition

Tabun Synthesis