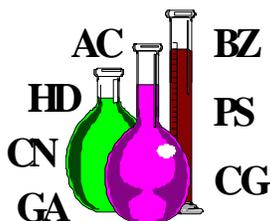


*U.S. Army Center for Health Promotion and Preventive Medicine*



*Detailed Facts About Nerve Agent GB*

218-03-1096

*Physical Properties of Nerve Agent GB*

<i>Chemical Structure</i>	$\begin{array}{c} \text{O} \quad \text{CH}_3 \\   \quad   \\ \text{H}_3\text{C}-\text{P}-\text{O}-\text{CH} \\   \quad   \\ \text{F} \quad \text{CH}_3 \end{array}$
<i>Chemical Formula</i>	C <sub>4</sub> H <sub>10</sub> F O <sub>2</sub> P
<i>Description</i>	GB-type nerve agents are clear, colorless, and tasteless liquids. They are odorless in vapor and pure form.
<i>Molecular Weight</i>	140.1
<i>Boiling Point</i>	147°C
<i>Vapor Pressure (mm Hg)</i>	2.9 @ 25°C
<i>Freezing Point</i>	-57°C
<i>Density</i>	Liquid = 1.09 Vapor = 4.9 (air = 1)
<i>Solubility</i>	Miscible
<i>Flash Point</i>	Nonflammable
<i>Volatility</i>	4,100 mg/m <sup>3</sup> @ 0°C 22,000 mg/m <sup>3</sup> @ 25°C 29,800 mg/m <sup>3</sup> @ 30°C

<b><i>Toxicity Values</i></b>	IC <sub>t50</sub> (skin)	= 35 mg-min/m <sup>3</sup> (15 l/min)
	LC <sub>t50</sub> (inhalation 0.5 to 2 min)	= 70 mg-min/m <sup>3</sup> (15 l/min)
	LD <sub>50</sub> (skin)	= 24 mg/kg
	1% Lethality	= 10 mg-min/m <sup>3</sup>
	No Death Levels	= 6 mg-min/m <sup>3</sup>

### ***Exposure Limits***

Workplace Time-Weighted Average -	0.0001 mg/m <sup>3</sup>
General Population Limits -	0.000003 mg/m <sup>3</sup>

## ***Toxic Properties of Nerve Agent GB***

*G-type nerve agents stored in the unitary stockpile are in ton containers, artillery shells, mortar projectiles, rockets, and land mines.*

GB is a lethal anticholinesterase agent. Its toxic hazard is high for inhalation, ingestion, and eye and skin exposure. Due to its high volatility, it is mainly an inhalation threat. Its rate of detoxification in the body is low. Effects of chronic exposures are cumulative. Following a single exposure to GB, daily exposure to concentrations of any nerve agent insufficient to produce symptoms may result in the onset of symptoms after several days. After symptoms subside, increased susceptibility persists for one to several days. The degree of exposure required to produce recurrence of symptoms, and the severity of these symptoms, depends on duration of exposure and time intervals between exposures.

### ***Overexposure Effects***

Signs and symptoms are the same regardless of route the poison enters the body (by inhalation, absorption, or ingestion): runny nose; tightness of chest; dimness of vision and miosis (pinpointing of the eye pupils); difficulty in breathing; drooling and excessive sweating; nausea; vomiting; cramps, and involuntary defecation and urination; twitching, jerking, and staggering; and headache, confusion, drowsiness, coma, and convulsion. These signs and symptoms are followed by cessation of breathing and death.

### ***Emergency and First Aid Procedures***

Inhalation: hold breath and don respiratory protection mask; if severe signs of agent exposure appear, administer immediately, in rapid succession, all three Nerve Agent Antidote Kits, Mark I injectors; use mouth-to-mouth resuscitation when approved mask-bag or oxygen delivery systems are not available; do not use mouth-to-mouth resuscitation when facial contamination exists; administer oxygen if breathing is difficult; seek medical attention immediately.

Eye Contact: flush eyes immediately with water for 10-15 minutes then don a respiratory protective mask. Although miosis may be an early sign of agent exposure, do not administer an injection when miosis is the only sign present; seek medical attention immediately.

Skin Contact: don respiratory mask and remove contaminated clothing; wash contaminated skin with copious amounts of soap and water immediately using 10 percent sodium carbonate solution, or 5 percent liquid household bleach; rinse well with water to remove decontamination; administer an intramuscular injection with the Mark I Kit if local sweating and muscular symptoms occur; seek medical attention immediately.

Ingestion: do not induce vomiting; first symptoms are likely to be gastrointestinal; administer immediately 2 milligrams (mg) intramuscular injection of the MARK I Kit auto injectors; seek medical attention immediately.

### ***Protective Equipment***

Protective Gloves:                      Wear Butyl Glove M3 and M4 Norton, Chemical Protective Glove Set.

Eye Protection:                         Wear chemical goggles; use goggles and faceshield for splash hazards.

Other:                                       Wear gloves and lab coat with M9 or M17 mask readily available for general lab work.

### ***Reactivity Data***

Stability:                                 Stable when pure, ~20 hours

Incompatibility:                         Attacks tin, magnesium, cadmium plated steel, some aluminums; slight attack on copper, brass, lead; practically no attack on 1020 steel, Inconel and K-monel.

Hydrolyzes to form HF under acid conditions and isopropyl alcohol and polymers under basic conditions.

***Persistency***                             Evaporates at approximately the same rate as water; depends upon munitions used and the weather.

### ***References***

1. Department of the Army Pamphlet (DA PAM) 40-8, *Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX*, December 1990.
2. Department of the Army Field Manual (DA FM) 3-9, *Potential Military Chemical/Biological Agents and Compounds*, 1990.

3. Army Regulation (AR) 385-61, *The Army Toxic Chemical Agent Safety Program*, July 1983.
4. U.S. Army Chemical Command Materiel Destruction Agency, *Site Monitoring Concept Study*, 15 September 1993.

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