

NERVE  
GASES

TB LW 34

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

**TREATMENT OF POISONING CAUSED  
BY CHEMICAL AGENTS OF THE G-  
SERIES**

Department of the Army, Washington 25, D. C., 10 March 1948

1. **INTRODUCTION.** Attention is directed to Circular 74, Department of the Army, 1948. Chemical casualties, caused by these agents, commonly known as the G-series (GA, GB, and GD) may occur. The following data are published for the information and guidance of medical officers in the treatment of such cases.

2. **PHYSIOLOGICAL EFFECTS AND MECHANISM OF ACTION.** The physiological effects of these agents are attributable, for the most part, to irreversible inactivation of cholinesterase (physostigmine-like action), and include pupillary constriction, spasm of the ciliary body of the eye lens, bronchoconstriction, bronchorrhea, increased motor activity of the gastro-intestinal tract, and generalized fibrillary skeletal muscular twitchings. Headache, nausea, vomiting, salivation, and diarrhea may be associated with the action of these agents. Following large doses, *death may occur* in a few minutes; with moderate doses, *death may be delayed for several hours*. In certain animals, the central nervous system is stimulated, and tonic and clonic convulsions result. This is true of the cat and dog and may also apply to man. Effects of subtoxic exposure may be cumulative so that subsequent moderate exposure may produce severe poisoning.

3. **TOXICOLOGY.** Toxic doses of these agents may result from breathing the vapors or from body contact with liquid.

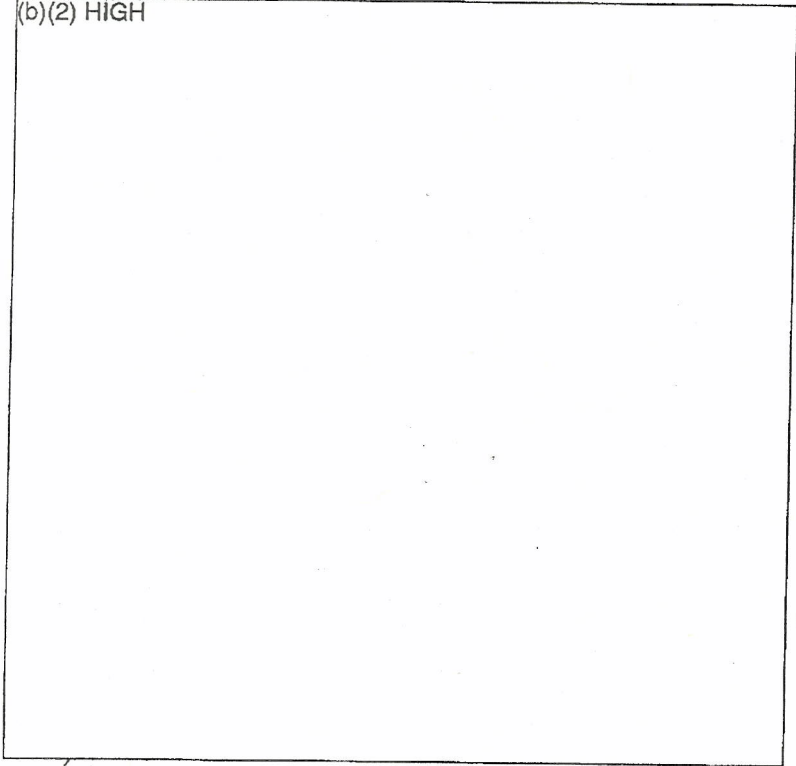
a. *Effect of vapors.* A few minutes (1 to 5) exposure of an unmasked individual to barely detectable concentrations of the vapors causes pupillary constriction and difficulty in visual accommodation in man. Slightly greater exposures cause pain in the chest, headache, nausea, and other effects as noted in paragraph 2. Animal experiments indicate that these agents are much more toxic on inhalation than war gases heretofore employed. Inhalation of saturated vapor

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for 1 minute may be lethal to man. Exposure of the unbroken skin to vapor appears to offer little threat of serious effect.

b. *Effect of liquid.* Liquid contamination of the skin is a real hazard. In animal experiments, small amounts of the liquid if left undisturbed on the skin may cause death in a matter of a few minutes. There may be localized muscular twitchings at the site of liquid contamination before generalized signs appear. Entrance to the body through the eye surfaces and through the linings of the mouth and nose is even more rapid.

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5. CAUSE OF DEATH. Death from poisoning is a result of respiratory failure brought about by a combination of the ultimate central depression and the peripheral paralysis of the muscles of respiration.

[AG 800.5 (4 Nov 47)]

ORDER OF THE SECRETARY OF THE ARMY:

OFFICIAL: OMAR N. BRADLEY  
EDWARD F. WITSELL *Chief of Staff, United States Army*  
*Major General*  
*The Adjutant General*

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For explanation of distribution formula see TM 38-405.



2. Detection.—a. Use of chemical agent detector kit, M9 and M9A1.

(1) After exposure to these agents, the blue dot tube, when heated, gives a blue color that fades out. The test will only detect vapor which is present over the liquid agents. It does not detect small concentrations which may be physiologically active. To make test, tear off lead wrapper and heating pad. Insert blue dot end of the glass tube into pump. Slowly take 25 full pump strokes. Remove from pump, and heat tube with matches or cigarette lighter for about 5 seconds. (Avoid excessive heating of tube, since this will char contents of the tube and invalidate the test results.) After tube is cool, add liquid from blue bottle to unmarked end of the tube. If gas is present, a blue ring will form in the upper end of the tube.

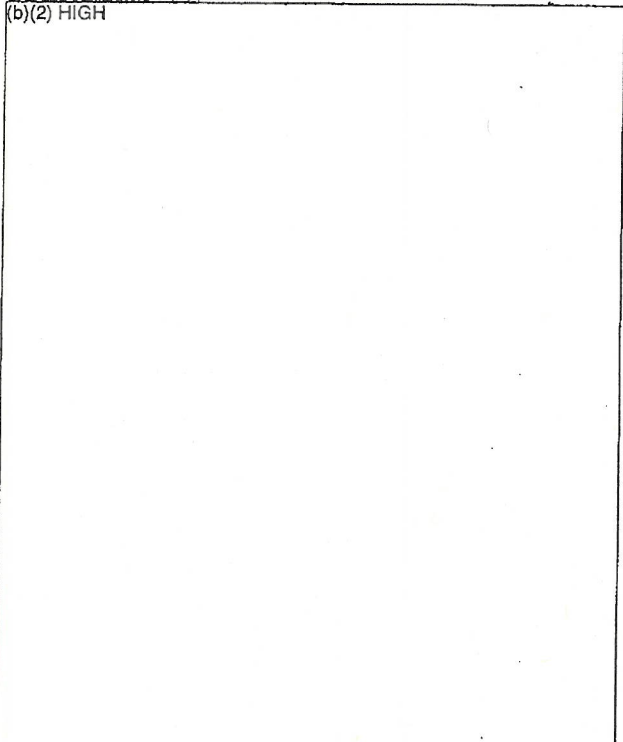
(2) Immediately after the dispersion of GA in moist air, hydrolysis products that are not detected with the blue dot tube can be recognized by use of the red dot tube of this kit. To make this test, tear off the wrapper, insert end marked with a red dot into pump, and slowly take five full pump strokes. A pink color indicates the presence of this agent or HN.

b. Use of paper, liquid vesicant detector, M6, or paint, liquid vesicant detector, M5.—Droplets of these agents will cause the olive-green color of these detectors to change to red.

4. Recognition.—These agents are not easily detected in the field by odor and the vapors are not irritating to the nasal passages. However, their presence can be recognized by observing the pin-point contraction of the pupils of the eyes of individuals exposed to very low concentrations of these gases. The alarm should be given pending verification of the presence of these agents by the detector kit.

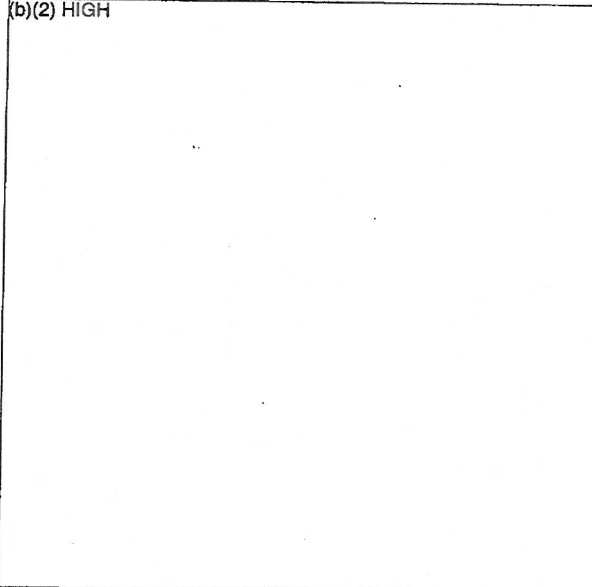
5. Protection.—a. Army gas mask.—This gas mask gives protection for the area and respiratory tract and for the skin covered by the facepiece.

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7. First aid.—General first-aid procedures outlined for treatment of casualties are effective for treatment of casualties from these agents. Contamination must be treated immediately by blotting the liquid and wipe the contaminated area with slightly alkaline or soapy water. Procedure first-aid treatment is outlined below.

Physiological effects

First aid

Vapors, when inhaled, cause nausea and diarrhea and may be followed by muscular twitching and convulsions. Even in low concentrations, they cause the pupil of the eye to contract. This makes it difficult to see, especially in dim light, and causes headache. After short exposure, a sense of tightness in the chest may be noticed, which is increased by deep breathing. Liquid does not injure the skin, but penetrates the skin and poisons the body. Contraction of the pupil may not appear as a warning sign under these conditions.

Adjust victim's mask and remove to a safe area, if possible. If stopped breathing, give artificial respiration. If liquid gets on skin it and wash the contaminated immediately with soapy water flood with water. Remove contaminated clothing, being careful not to contaminate yourself or other of the victim's body. If liquid the eye, flush immediately with or a solution of sodium bicarbonate in water.

8. Reference.—More detailed information is contained in TB OW 84, Treatise of Poisoning Caused by Chemical Agents of the G-Series. (AG 470.6 (4 Nov 47))

BY ORDER OF THE SECRETARY OF THE ARMY:

OFFICIAL:  
EDWARD F. WITSELL  
Major General  
The Adjutant General

OMAR N. BRADLEY  
Chief of Staff, United States Army

Effective until 19 September 1949 unless sooner rescinded or superseded

### CHEMICAL AGENTS OF THE G-SERIES

A series of chemical agents, commonly known as the G-series (GA, GB, and GD), may be encountered in the event of gas warfare. The following data, pertaining to these agents, are published for the information and guidance of all concerned and will be brought to the attention of all troop and staff officers:

1. Classification and use.—These agents are *casualty-producing blood and nerve poisons*, and are *moderately persistent*. They may be used to produce casualties or deny ground through threat of casualties. In light concentration they may be used for harassing effect. They may be disseminated by shell, rocket, land mine, air bomb, or spray attack. These agents are extremely dangerous and react very rapidly to produce casualties among unprotected personnel. Gas masks should be donned immediately if there is a suspicion of their presence pending confirmation by tests described in paragraph 8. Inhalation of the *vapors*, or *liquid* contamination of the skin, may cause death in a few minutes. There appears to be little threat of serious effect to an individual protected by the Army gas mask through exposure of the unbroken skin to the vapor of these agents.

2. Properties.—These agents are liquid organic compounds with little or no odor. They react slowly with water, rapidly with strong acids or alkalis. Reaction products are less toxic than the agents themselves. Nonpersistent toxic gas is liberated by the reaction of GA with sodium bicarbonate solution and by action of bleach on this agent. The liberated gas is dangerous if set free in appreciable quantities.

#### REFERENCE CHART

	GA	GB	GD
Odor-----	Faint, sweetish, fruity.	Odorless.	Odorless.
Color and state in field.	Colorless or brownish liquid and vapor.	Colorless liquid and vapor.	Colorless liquid and vapor.
Effects on body----	Dimmed vision due to contraction of the pupils, headache, nausea, vomiting, diarrhea and stomach cramps, rapid breathing, tightness of chest, muscular twitching and weakness, convulsions, prostration, and, in some instances, ultimate death.		
Persistence-----	Moderately persistent to persistent.	Slightly to moderately persistent.	Persistent.
Action on food and water.	Until special methods for decontaminating have been developed and instructions issued, contaminated water will be discarded and contaminated food destroyed.		
Action on metals--	None.	Slight corrosive action.	Slight corrosive action.