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Aggrs

WAR DEPARTMENT  
The Adjutant General's Office  
Washington 25, D. C.

AG 723.13 (15 Jun 45)OB-S-SPINT

ALE/bg 2B 939 Pentagon

19 June 1945

SUBJECT: New German Gas, MDE, Preliminary Report.

TO: Commander-in-Chief, U. S. Army Forces Pacific  
Commander-in-Chief, Southwest Pacific Area  
Commanding Generals,  
Pacific Ocean Areas  
Burma-India Theater  
China Theater  
(Attn: Theater Chemical Officers and  
Theater Surgeons)

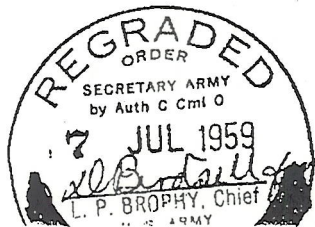
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:Date: 19 Jun 45 :  
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I. General.

On occupation of Germany a new and potentially useful group of chemical warfare agents was discovered, one of which had been manufactured and loaded into munitions in large quantities. There is no reason to believe that the Japanese are aware of the existence of these agents.

The object of this memorandum is to make available for immediate issue to those concerned such information as will assist commanders, theater and army chemical and medical officers and field laboratory organizations to appreciate the possible hazards arising from its use by the enemy, to apply the best available methods of detection and identification, and to indicate the protective measures necessary in the event of its employment. Should the emergency arise, the appropriate sections of the memorandum will be issued to Corps and Division, Chemical Warfare and Medical Officers, Unit Gas Officers, and others specially concerned. Until such emergency arises, the circulation should be limited to Theater and Army Chemical Warfare and Medical Officers and the SECRET classification should be preserved.

The agent manufactured in largest quantities has been investigated by U. S. CWS. The Germans refer to this agent as Trilon, Takoon, Tabun, Le 100 or T-89. The British refer to it as EOP or T-1104. The U.S. CWS symbolize it as MDE. This agent was found in 105 mm. shell and in 250 kg. bombs. The shell filling was 50% MDE and 20% monochlorobenzene. The bombs contain the relatively pure agent. Investigations are continuing and studies of the other agents will be undertaken as the compounds become available. Such information as is now available has been summarized below.



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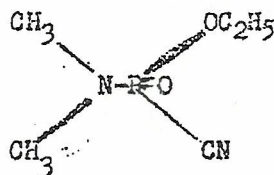
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II. Chemical Aspects.

A. Formula.

MCE is the ethyl ester of dimethylaminocyanophosphoric acid, (dimethylaminocyanoeethnophosphine oxide).



B. Physical Properties.

1. Refractive index  $n_{\frac{20}{D}}^{\frac{20}{P}} \approx 1.4240 - 1.4243$ ;  $n_{\frac{25}{D}}^{\frac{25}{P}} \approx 1.4224 - 1.4246$ .

2. Density = 10°C. ----- 1.087 gm./ml.  
20°C. ----- 1.077 gm./ml.  
25°C. ----- 1.073 gm./ml.  
30°C. ----- 1.068 gm./ml.  
35°C. ----- 1.064 gm./ml.

3. Vapor pressure = 20°C. ---- 0.038 mm.  
30°C. ---- 0.097 mm.  
35°C. ---- 0.148 mm.  
40°C. ---- 0.210 mm.  
45°C. ---- 0.254 mm.

4. Freezing Point - below -50°C.

5. Odor - slight, sweetish, fruity; median detectable concentration  $\approx 2.3 \text{ mg./m}^3$ .

6. Solubility - approximately 5% in water at 20°C., and soluble in most organic solvents.

C. Decontamination.

1. MCE is completely decomposed in water in less than 24 hours, in saturated sodium bicarbonate in less than an hour, and in 5% solution of sodium hydroxide in less than 15 seconds. It is also decomposed by bleach paste and quickly by solutions of acids. AG or cyanide ions always are liberated by these reactions. The toxicity of the other reaction products has not been established, but is presumably low.

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## D. Detection.

1. Due to the AC liberated by the decomposition of the agent, 3-8  $\delta$ -gammas of MCE can be detected by the red dot tube in the Kit, Chemical Agent Detector, M9. The metanil-yellow-mercuric chloride type detector also gives positive test for this agent.

2. An AC detector tube is being developed for inclusion in the M9 Kit. Two compositions of detector gel are now being studied, both of which are sensitive in the range of 3-25  $\delta$ -gammas.

These are:

a. 97.9% silica gel  
0.1% tetramethyldiaminodiphenylmethane  
0.5% salicylic acid  
0.001% red dye TLA No. 35

b. 96.5% silica gel  
0.5% N-(P-anisyl)morpholine  
1.0% phthalic acid  
2.0% copper sulfate  $\cdot 5H_2O$ .

3. MCE can be detected on food using Kit, Food Testing, Screening: For Chemical Warfare Agents, by spotting a few drops of the Chloramine-T solution on the contaminated surface and then pressing the mustard test paper against the moistened surface for about a minute. CK, formed by action of Chloramine-T, produces a yellow-orange color on the gel surface. Quantitative measurements of the sensitivity have not been made.

4. The Chlorine Demand Test, when performed as directed in instructions for operating the Kit, Water Testing, Screening, will not detect fresh MCE contamination of water, but will detect it after sufficient hydrolysis has taken place to liberate 3 parts per million of cyanide ion. In the case of 100 ppm MCE contamination, a positive Chlorine Demand Test will be obtained after two hours hydrolysis.

5. Using Kit, Water Testing, Poisons, Treatment Control, the presence of cyanide and cyanide containing compounds can be detected. The Quantitative Arsenic Test may be used for the quantitative determination of phosphorus containing agents, such as MCE, in the absence of other agents containing arsenic.

## E. Identification.

1. Hydrolysis of the agent with 3N sulfuric acid gives dimethyl amine sulfate quantitatively.

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2. As a derivative of the dimethylamino fragment, dimethylammonium-aurichloride  $(CH_3)_2NH_2AuCl_4$ , m. p. 192-196°C. (corr.) (lit., 195-197°C.) has been prepared.

3. Treatment of the agent with hydriodic acid gives a quantitative yield of ethyl iodide.

4. A derivative of the chlorobenzene present in the shell may be prepared as 2,4-dinitrochlorobenzene, m.p. 50.6-51.1°C. (lit., 52°C.).

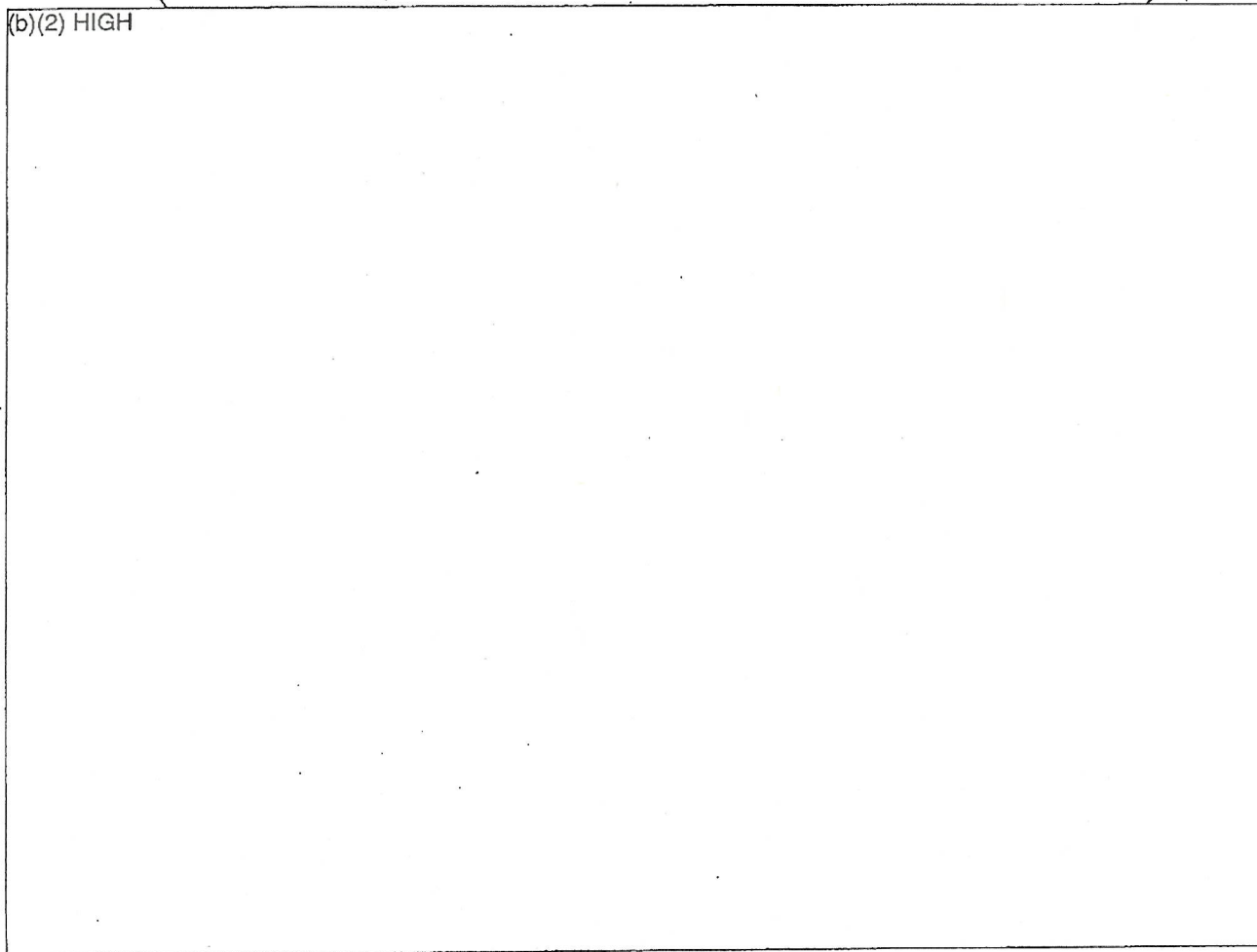
5. Hydrolysis with 0.1N sodium hydroxide gives sodium cyanide quantitatively.

III. Medical Aspects.

A. Physiological Effects and Mechanism of Action.

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Treatment

(b)(2) HIGH

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D. Protection.

(b)(2) HIGH

*b(2) high*

By order of the Secretary of War.

*Lester Jensen*  
Adjutant General.

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