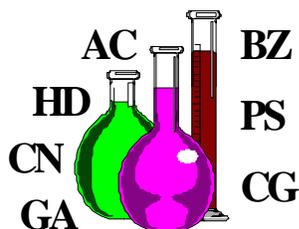


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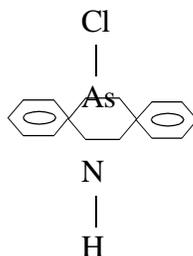


*Detailed Facts About Vomiting Agent Adamsite  
(DM)*

218-17-1096

*Physical Properties of Adamsite*

*Chemical Structure*



*Chemical Formula*

$C_{12}H_{10}AsClN$

*Description*

Light green to yellow crystals at room temperature; irritates nasal passages similar to pepper; no odor, but irritating.

*Molecular Weight*

277.54

*Boiling Point*

410°C

*Vapor Pressure (mm Hg)*

Forms no appreciable vapor.

*Freezing Point*

195°C

*Density*

Solid = 1.65 @ 20°C  
Vapor = negligible

*Solubility*

Soluble in furfural and acetone; slightly soluble in common organic solvents; insoluble in water. Not readily soluble in any of the liquid chemical warfare agents.

*Flash Point*

Does not flash.

**Volatility** 19,300 mg/m<sup>3</sup> @ 0°C  
26,000 to 120,000 mg/m<sup>3</sup> @ 20°C  
72,500 to 143,000 mg/m<sup>3</sup> @ 25°C

**Toxicity Values** Ict<sub>50</sub> = 22 to 150 mg-min/m<sup>3</sup>  
Lct<sub>50</sub> = variable, average 11,000 mg-min/m<sup>3</sup>  
NOAEL (inhalation) = 4 mg-min/m<sup>3</sup>

***Airborne Exposure Limit (AEL)***

Workplace Time-Weighted Average - No standard identified  
General Population Limits - No standard identified

***Toxic Properties of Adamsite***

*DM was first produced during World War I. Adamsite was not toxic enough for the battlefield, but it proved to be too drastic for use against civilian mobs; it was banned for use against civilian populations in the 1930s in the Western nations. DM was produced worldwide until superseded by the CN series of tear agents.*

***Overexposure Effects***

DM is a vomiting compound. It is normally a solid, but upon heating, DM first vaporizes and then condenses to form aerosols. It is toxic through inhalation, ingestion, and skin contact. Adamsite is dispersed as an aerosol, irritating to the eyes and respiratory tract but not necessarily to the skin. Under field conditions, vomiting agents can cause great discomfort to the victims; when released indoors, they can cause serious illness or death. Symptoms include irritation of eyes and mucous membranes, coughing, sneezing, severe headache, acute pain and tightness in the chest, nausea, and vomiting. DM has been noted to cause necrosis of corneal epithelium in humans. The human body will detoxify the effects of mild exposures within 30 minutes of evacuation. Severe exposures may take several hours to detoxify and minor sensory disturbances may persist for up to one day.

***Emergency and First Aid Procedures***

Inhalation: remove victim to fresh air; wear a mask/respirator in spite of coughing, sneezing, salivation, and nausea; lift the mask from the face briefly, if necessary, to permit vomiting or to drain saliva from the facepiece; seek medical attention immediately.

Eye Contact: don a respiratory protective mask; seek medical attention immediately.

Skin Contact: rinse the nose and throat with saline water or bicarbonate of soda solution; wash exposed skin and scalp with soap and water and allow to dry on the skin; dust the skin with borated talcum.

Ingestion: seek medical attention immediately; carry on duties as vigorously as possible; this will help to lessen and shorten the symptoms; combat duties usually can be performed in spite of the effects of sternutators.

### ***Protective Equipment***

Protective Gloves: Wear Chemical Protective Glove Set.

Eye Protection: Wear chemical goggles; wear a mask/respirator in open areas.

Other: Wear additional protective clothing, such as gloves and lab coat with an M9, M17, or M40 mask readily available in closed or confined spaces.

### ***Reactivity Data***

Stability: Stable in pure form; after 3 months, caused extensive corrosion of aluminum, anodized aluminum, and stainless steel; will corrode iron, bronze, and brass when moist.

Hydrolysis Rate: Acidic (pH) - 0.5 percent; prevents hydrolysis at room temperature; 9.8 percent HCl; prevents hydrolysis @ 70°C. Basic (pH) - slowly hydrolyzes in water.

Hydrolysis Products:  $[\text{NH}(\text{C}_6\text{H}_4)_2\text{AS}]_2\text{O}$  & HCl.

Corrosive Properties: Titanium - 71°C, 6 months, appeared good.  
Stainless Steel - 43°C, 30 days, slight discoloration.  
Common Steel - 43°C, 30 days, covered with rust.  
Aluminum Anodized - 43°C, 30 days, minor corrosion and pitting. Aluminum - 43°C, 30 days, severe corrosion.

***Persistency*** Short, because compounds are disseminated as an aerosol. Soil - persistent Surface (wood, metal, masonry, rubber, paint) - persistent. Water - persistent; when material is covered with water, an insoluble film forms which prevents further hydrolysis.

### ***References***

1. Department of the Army Field Manual (DA FM) 3-9, *Potential Military Chemical/Biological Agents and Compounds*, 1990.
2. Department of the Army Technical Manual (DA TM) 3-250, *Storage, Shipment, Handling, and Disposal of Chemical Agents and Hazardous Chemicals*, 1969.

3. *The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Eleventh Edition*, Merck & Co., Inc., Rahway, New Jersey, 1989.
4. Somani, Satu M., *Chemical Warfare Agents*, Academic Press, Inc., San Diego, California, 1992.
5. U.S. Army Chemical Command Materiel Destruction Agency, *Site Monitoring Concept Study*, 15 September 1993.

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