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# GAS IDENTIFICATION SETS

NAVY



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A BUREAU OF ORDNANCE PUBLICATION

OP 15-2860

# GAS IDENTIFICATION SETS



14 JUNE 1945

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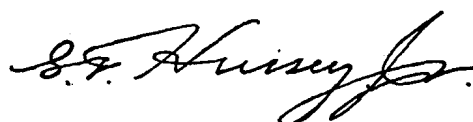
NAVY DEPARTMENT  
BUREAU OF ORDNANCE  
WASHINGTON 25, D. C.

14 June 1945

ORDNANCE PAMPHLET 1447

GAS IDENTIFICATION SETS

1. Ordnance Pamphlet 1447 furnishes instructions for the use, stowage, and replacement of gas identification sets and a description of their component parts.
2. Initial requests for material described in this pamphlet as well as requests for replacements should be made as outlined in existing allowance lists and Ordnance publications.
3. This publication supersedes NAVORD OCL X14-42 and Army Chemical Warfare School Pamphlet Number 4, both of which should be destroyed.
4. For training methods and procedures, FTP 222 provides a ready source of additional information.



G. F. HUSSEY, JR.,  
*Rear Admiral, U. S. Navy,*  
*Chief of the Bureau of Ordnance*

## CHAPTER 1

### INTRODUCTION

#### 1. PURPOSE

These instructions are intended to provide information for the use of gas identification sets in training personnel in the recognition of gases which might be encountered in the field in the event of gas warfare, and to supply information as to recommended stowage and disposal.

#### 2. TYPES OF SETS

This publication applies only to the following sets: all of which are procured from the Chemical Warfare Service:

- Set, Gas Identification, Instructional, M1.
- Set, Gas Identification, Instructional, (Navy) HN.
- Set, Sample, Replacement (for Gas Identification Set, Instructional, M1 or HN).
- Set, Gas Identification, Detonation, M1.

Set, Accessories (Gas Identification, Detonation) M1.

#### 3. METHOD OF ISSUE

For the purpose of issue, accounting, and stock recording purposes, gas identification sets are treated as ammunition. All records regarding this material should be kept in accordance with standard procedures for ammunition. They should be requested by letter and not by requisition form.

#### 4. GENERAL PRECAUTIONS

While the chemical agents used in the above sets are not always of full concentration, they must be treated with the same respect as any agent of full concentration. Casualties can and will result from undue exposure. The sets must never be handled carelessly or roughly. Particular attention must be paid at all times to the proper stowage of the sets when not actually in use.

## CHAPTER 2

### DESCRIPTION, STOWAGE, AND SHIPMENT OF GAS IDENTIFICATION SETS

#### 5. GENERAL

The sets available for gas identification are of two types: one, the Set, Gas Identification, Instructional, is for indoor and shipboard use, and the other, the Set, Gas Identification, Detonation, is for outdoor use ashore. In addition, the replacement set for the Set, Gas Identification, Instructional, and the accessories set for the Set, Gas Identification, Detonation are discussed. The detonation set is for shore-based activities only and is never issued to ships.

#### 6. SET, GAS IDENTIFICATION, INSTRUCTIONAL, M1

This set is often called the "Sniff Set." It consists of actual agents in individual glass bottles with glass stoppers ground to make an air-tight fit. Each bottle is etched on the side to show the symbol of the agent. There are seven bottles in all with agents as follows:

- Two of Mustard (H)\* (Each bottle contains 25 cc. of Mustard adsorbed by 90 cc. of activated charcoal.)
- One of Phosgene (CG) (The bottle contains 3 grams of solid Triphosgene. Phosgene evaporates from this solid.)
- One of Chlorpicrin (PS) (The bottle contains 25 cc. of Chlorpicrin adsorbed by 90 cc. of activated charcoal.)
- One of Chloracetophenone (CN) (The bottle contains 15 grams of solid Chloracetophenone.)
- One of Lewisite (L)\* (The bottle contains 25 cc. of Lewisite adsorbed by 90 cc. of activated charcoal.)
- One of Adamsite (DM) (The bottle contains 15 grams of solid Adamsite in a cloth bag.)

\* Bottles may be marked HS, instead of H, and M-1 instead of L. These are the symbols formerly used to denote these agents.

Activated charcoal is used as an adsorbent for the Mustard, Lewisite, and Chlorpicrin, which are liquids at ordinary temperatures. Adamsite in its solid state is placed in the bottle in a securely tied cloth bag. Chloracetophenone is placed in the bottle in its solid state and the bottle heated until the solid melts and forms an even coat on the bottom. The same thing is done to make the phosgene sample except that Triphosgene is used. This solid, as it vaporizes, gives off the Phosgene Gas.

The stoppers are ground to fit each bottle and should be kept in the bottles with which originally issued. Each bottle is packed in a metal can with a friction top. The symbol of the agent contained is etched on the bottle and marked on the lid of the can. In accordance with I.C.C. regulations, each bottle is surrounded by sawdust or wood pulp in the can and each can is surrounded by one inch of wood pulp when placed in its section in the packing box.

The packing box is a sectioned wooden box with a hinged top as shown in Figure 1. The complete unit weighs seventy-one (71) pounds. The box measures 30 inches long by 14 $\frac{3}{8}$  inches wide by 11 $\frac{1}{2}$  inches high with a cubic displacement of 2.77 cubic feet. The set is classified in the Interstate Commerce Commission Regulations as Class A, "Extremely Dangerous Chemicals." For this reason, this set must never be reshipped or transported by commercial carrier unless packed as described in the preceding paragraph of this section, and labeled with Poison Gas label. Not more than 10 gas identification sets (either type) can be shipped in one Railway Express car, unless a waiver is obtained. Overseas shipments should be made in accordance with Coast Guard regulations as set forth in NavCG 108 "Regulations for Handling Ammunition Aboard Ship During the Present Emergency."



Figure 1—Set, Gas Identification, Instructional, MI

The stowage of instructional gas identification sets in quantities should conform where possible to the rules set forth for the stowage of chemical ammunition in the Bureau of Ordnance Manual and Ordnance Pamphlet Number 5, Volume 1. However, since it is not expected that these sets will ever be on hand at any depot in full magazine quantities, and since they do not constitute an explosive hazard, it is permissible to stow them with other chemical munitions, with smoke pots, and with chemical and smoke grenades. Such magazines should be marked with a placard to warn personnel of the contents, in addition to the standard magazine marking. The sets must be segregated from the other material and proper aisle space maintained in accordance with good stowage procedure. For classroom use, the individual sets may be stowed in the classroom when not in use, provided they are not accessible to unauthorized personnel. The bottles must be stoppered and returned to the proper cans in the

box. The sets may be stored aboard ship in any convenient place except magazines containing ammunition. Locations where there is excessive vibration or movement should be avoided.

The sets should be kept as cool as possible as the agents vaporize more rapidly with increased temperature. This may result in pressure being built up in the bottles with the ensuing danger of contamination to the person opening the bottle. High temperature also shortens the life of the bottles. When stowed in classrooms, storerooms or ship's compartments, they should be placed away from radiators and steam pipes. Do not allow sets to remain too long in brilliant sunshine.

Requests for the Set, Gas Identification, M1 are to be made in accordance with established procedures for obtaining Chemical Warfare Training material. Stocks are available at all Naval Ammunition Depots.

If it becomes necessary to dispose of complete sets, the procedure as outlined in this chapter under Set, Sample Replacement should be followed.

## 7. SET, GAS IDENTIFICATION, INSTRUCTIONAL, (NAVY) HN

As a supplement to the Set, Gas Identification, Instructional, M1, the Bureau of Ordnance has made up a set of the two most common nitrogen mustards. It consists of two bottles, one containing 25 cc. of the agent HN1, and the other, 25 cc. of the agent HN3. Both are actual agents; they are liquids at ordinary temperatures and are absorbed by activated charcoal placed in the bottles.

The two bottles are placed in cans in a wooden packing box packed in the same manner as the bottles in the Set, Gas Identification, Instructional, M1, and as shown in Figure 2. The filled box weighs eighteen (18) pounds and measures 7½ inches wide by 16 inches long by 11¾ inches high, with a cubic displacement of .816 cubic feet. They may be stored and shipped with the Set, Gas Identification, Instructional, M1, and the same regulations apply.

The Navy HN sets are always to be requested with the Set, Gas Identification, Instructional, M1. Requests should be made in accordance



Figure 2—Set, Gas Identification, Instructional, (Navy) HN

with established procedures for obtaining Chemical Warfare Training material. Inasmuch as this set has not been issued previously, all shore activities and ships should request sets to supplement the instructional sets, M1 on hand.

When the bottles are exhausted, replacement should be requested and disposal made as outlined in this chapter under Set, Sample Replacement.

### **8. SET, SAMPLE REPLACEMENT (FOR GAS IDENTIFICATION SET, INSTRUCTIONAL, M1 AND SET, GAS IDENTIFICATION, INSTRUCTIONAL, NAVY, HN)**

The sample replacement sets are for replacement of sniff bottles of either of the two previously described sets when they have reached a state of exhaustion. A replacement set consists of two bottles of any one agent packed in cans and a wooden box which is identical, with the exception of the marking, to the box for the Set, Gas Identification, Instructional, (Navy), HN, as shown in Figure 2. It weighs eighteen (18) pounds and measures 7½ inches wide by 16 inches long by 11¾" high and has a cubic displacement of .816 cubic feet. The same regulations as for the Set, Gas Identification, Instructional, M1 apply.

When the bottles of an instructional identification set have reached a state of exhaustion, replacement should be requested from the nearest Naval Ammunition Depot. Upon receipt of the replacement set, the exhausted bottle should be replaced by one of the new bottles, and the old bottle destroyed as outlined in this chapter under the next paragraph. The other new bottle should be retained in the packing box for future use.

Contrary to the instructions in the Chemical Warfare School Pamphlet Number 4, and in other previously issued publications, the exhausted bottles are not to be returned to the Eastern Chemical Warfare Depot. Instead, the bottles are to be destroyed at the activity in accordance with these instructions when possible. If the limitations of the station are such that this is not possible, the bottles should be returned in exactly the same type of packing as received to the nearest Naval Ammunition

Depot for disposal. It is permissible to retain exhausted bottles in the packing units until there is sufficient quantity on hand to lessen the labor of disposal.

The following procedure is to be followed when disposing of sniff bottles, whether singly or in quantities, at shore stations: The bottles should be taken from the packing boxes, their stoppers removed and the bottles placed open end up in a pit at least five feet deep. The pit should be located at least two hundred (200) yards away from any building or wellsite. A slurry made of 5 parts by volume of Bleach (chloride of lime) to 4 parts of water should be poured in and over the bottles, and this covered with a layer of earth. An additional application of the slurry should then be made and the pit filled and marked. Rubber gloves should be worn and every care must be taken that no contact is made with the contents of the bottles. Any tools that may have become contaminated, including the gloves, should be decontaminated in accordance with standard procedure, as outlined in FTP 222. Disposal at sea by dumping "overboard in deep water" (over 150 fathoms deep and at least 10 miles from shore) may be made by removing the stoppers and placing the opened bottles in a weighted sack or previously perforated metal container. The sack or container should then be thrown from the leeward side or fantail of the ship taking care that no contact is made with the contents.

### **9. SET, GAS IDENTIFICATION, DETONATION, M1**

A complete detonation gas identification set consists of a metal shipping cylinder in which are packed forty-eight hermetically sealed glass tubes containing identification specimens of chemical agents. These are divided equally between four agents—Mustard, Lewisite, Chlorpicrin, and Phosgene. Each glass tube is packed in an individual fiber container. Twelve of these are packed in a multiple tube container which may be metal or fiber. The agents in each multiple container are as follows:

- 3 tubes, H, each containing 40 cc. of 5% solution of H (Mustard) in chloroform

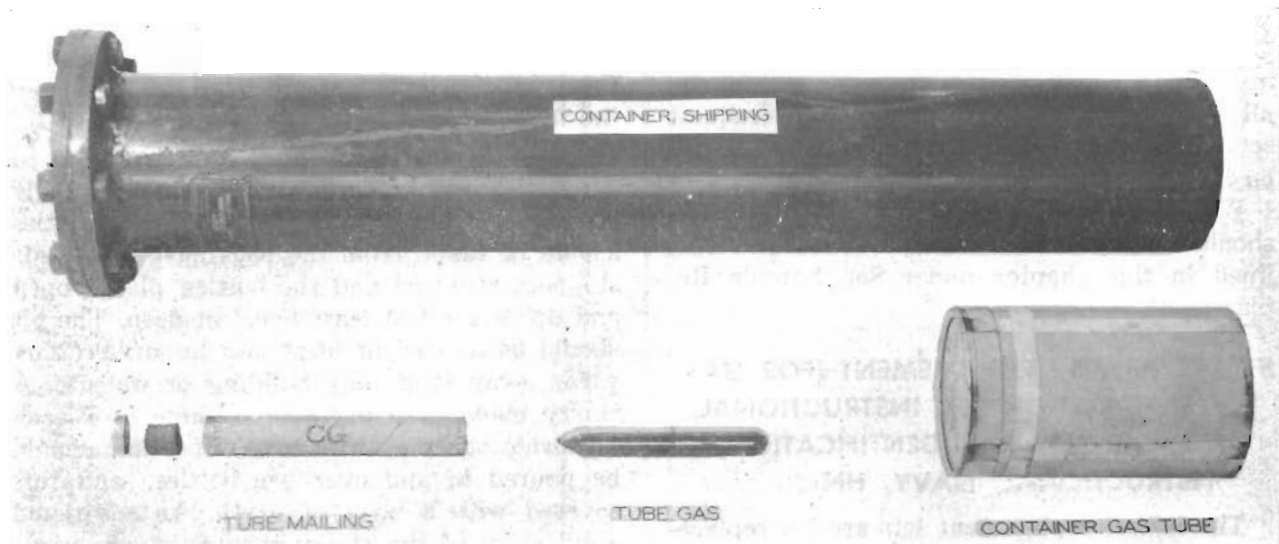


Figure 3—Set, Gas Identification, Detonation, M1

- 3 tubes, L, each containing 40 cc. of 5% solution of L (Lewisite) in chloroform
- 3 tubes, PS, each containing 40 cc. of 50% solution of PS, (Chlorpicerin) in chloroform
- 3 tubes CG, each containing 40 cc. of 100% CG (Phosgene)

Instructions for use and strips of adhesive tape are included in the container. Four of these multiple containers as described are packed in a drawn steel container as shown in Figure 3. Double faced corrugated cardboard fillers are placed on top of the containers, and a double faced corrugated strawboard filler is placed on the bottom so that well-cushioned packing is supplied when the blind flange with its gasket is bolted down tight on the shipping container flange. This packing is airtight and will stand 250 pounds per square inch internal pressure when bolted tight. The nuts are hexagonal and can be removed with a standard  $1\frac{1}{4}$  inch wrench or a monkey wrench. The diameter at the flange is  $9\frac{1}{4}$  inches and the cylinder is  $6\frac{3}{4}$  inches in diameter. The overall height is  $40\frac{1}{4}$  inches. The filled weight is 110 pounds.

The Detonator, Electric, No. 8, as shown in Figure 4, (Blasting Cap) is the only detonator authorized for use with this set. These are primarily packed in a large wooden box which contains smaller metal boxes each containing 70 detonators. The detonators are packed in

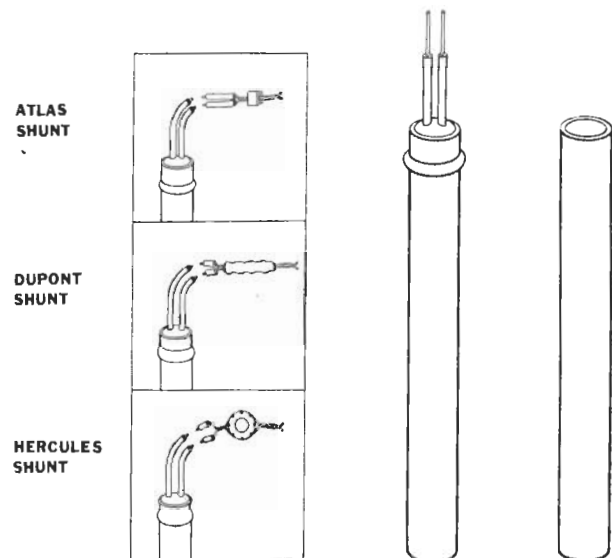


Figure 4

sawdust and the metal boxes are also surrounded by sawdust. The Naval Ammunition Depot will repack the number of metal boxes corresponding to the quantity requested. Seventy detonators should be requested with each Set, Gas Identification, Detonation, M1, unless sufficient quantity are on hand. Detonators with 6 feet leads or longer are preferable.

The Set, Gas Identification, Detonation, M1 may be stored at depots with inert material where there is no possibility of fire hazard, or

with other chemical ammunition of types 3 and 4, paragraph 2806 of Ordnance Pamphlet 5. They must be stored, however, with all due regard to regulations governing trespassing by unauthorized personnel. At training stations, they may be stored in any convenient place where they will not be tampered with. All unused tubes must be returned to their multiple containers, the containers to the metal shipping cylinder and the *flange bolted* wrench tight. Individual tubes or cans of tube must not be stowed outside of the metal cylinder. In no case is the metal cylinder to be returned until all tubes are expended. The Set, Gas Identification, Detonation, M1 should be kept as cool as possible. If exposed to high temperatures (over 100° F.), the CG tubes may burst and a dangerous concentration of CG may be encountered on opening the cylinder. Always have a gas mask readily available when opening the metal cylinder.

Electric Detonators must be stored in standard, earth-covered detonator or fuze-type magazines in which no other ammunition or material is stored. They shall not be located in the same compartment with, or near radio apparatus or antenna leads. At training activities where such storage space is not available, small quantities, (never more than 350), may be stored in any dry shelter but *must not be left, kept, or stored* where unauthorized persons have access to them, where they are exposed to the direct rays of the sun, heating pipes, or any undue temperatures (over 100° F.), with or near radio apparatus or antenna leads, or in dwellings, offices, or other inhabited buildings.

Excess detonators should not be retained at training activities where magazine stowage is not available but should be disposed of by detonation. When quantities of less than ten (10) are detonated, they should be detonated individually in a pit one foot deep from a distance of at least 25 yards. Sizeable quantities may be detonated in a metal can such as a 5-gallon paint can. This should be placed in a pit about four feet deep and approximately the size of the drum, in a location removed at least 300 feet from any building, magazine, or structure, and not less than 500 feet from private prop-

erty or public highway. Up to ten (10) detonators at one time may be detonated by tying in a bundle and connecting one of the detonators to a blasting machine. The machine should be operated at a distance of at least 200 feet from the pit and behind suitable cover. After the explosion, sufficient time (at least five minutes) must elapse before proceeding to the scene, especially in case of a misfire, and the circuit must be broken in such a manner that it cannot be accidentally closed while personnel are not under cover.

The set itself is packed in accordance with Interstate Commerce Regulations and may be shipped by commercial carrier. It must be labeled with the Poison Gas label. Under no circumstances are the contents of the steel cylinder ever to be shipped other than in the steel container. If it is ever necessary to return a partial set, the shipments must be made in the steel container tightly bolted and any voided space completely filled with cushioning material. Overseas shipments must be made in accordance with the regulations in NavCG 108, "Non-explosive Chemicals." The detonators must be shipped in accordance with regulations covering relatively safe explosives in the Interstate Commerce Regulations; overseas shipments, in accordance with regulations in NavCG 108 for explosive ammunition.

Should it be necessary to dispose of tubes from detonation sets, the tubes may be detonated individually or in series, but should be placed in a pit and the decontamination procedure outlined above followed.

Whenever possible, the empty cylinders are to be returned to the Eastern Chemical Warfare Depot, Edgewood Arsenal, Maryland. However, in no case are cylinders to be emptied upon receipt and returned although instructions on Army shipping tickets may so state. Such instructions apply to cylinders issued for use by the Army and are not to be followed for those issued for Navy use. Containers are to be retained and unexpended tubes replaced in them after each use until all the tubes are expended. At ex-continental activities the empty cylinders may be disposed of in accordance with existing procedures for the area for disposal of scrap metal.

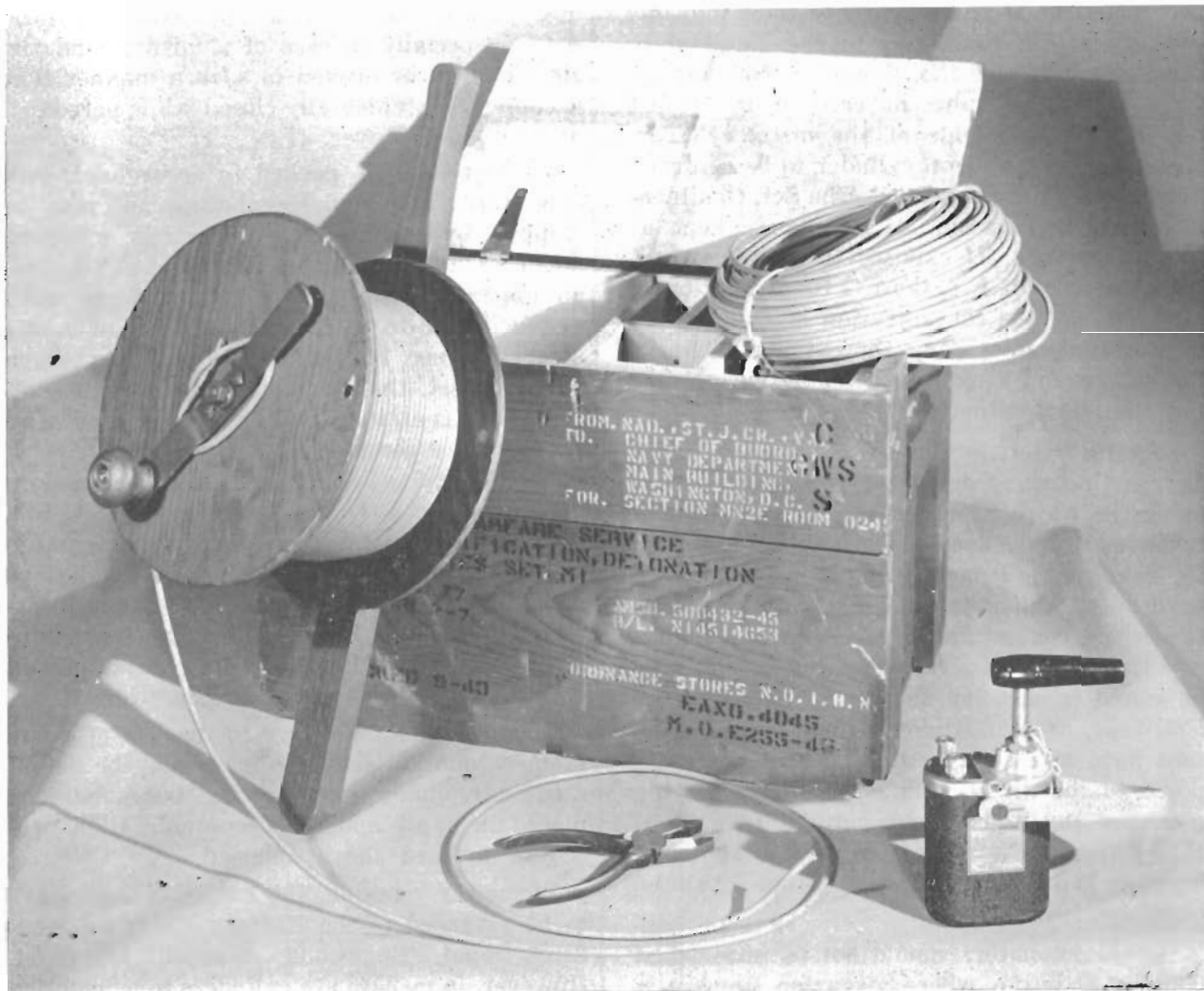


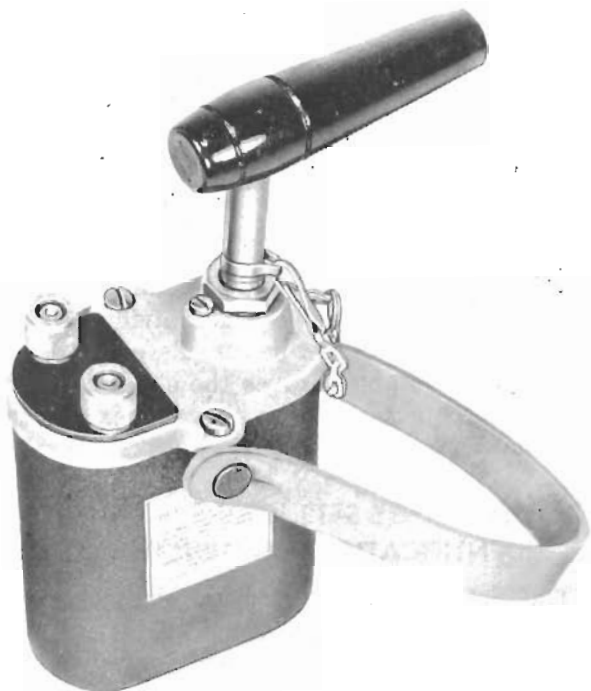
Figure 5—Set, Accessories, (Gas Identification, Detonation), MI

**10. SET, ACCESSORIES, (GAS IDENTIFICATION, DETONATION) M1**

Means for detonating the tubes of the detonation set are provided in the Set, Accessories, (Gas Identification Detonation), M1 (see Figure 5), which contains the following:

1. 1,000 feet, rubber covered firing wire No. 18 B&S gauge.
2. Wire reel.
3. Blasting machine, 10-cap capacity. (Figure 6)
4. Pliers—8-inch side cutting. (Figure 11).

These are packed in a wooden box approximately 23 $\frac{3}{8}$ " by 16" by 14" high. The filled box weighs 68 pounds. These sets should be requested as needed for use with the detonation sets. They are not expendable and when not needed, they should be turned in to the nearest Naval Ammunition Depot, or disposition should be requested from the Bureau of Ordnance.



*Figure 6—Machine, Blasting, Ten Cap*

## CHAPTER 3

### USE OF GAS IDENTIFICATION SETS

#### 11. GENERAL

The gas identification sets are of two types; i.e., the instructional sets, (Sniff Sets) for indoors and shipboard use, and the detonation set for outdoor use. The instructional sets are complete and ready for use after they have been unpacked and opened. The detonation set requires detonators and accessories not included in the set for its use. Both types are dangerous if improperly handled and must never be handled carelessly or roughly. The following paragraphs should be read and understood before any of the sets are used.

Odors of chemical agents are the most readily available means of identification; however, in the case of some agents a concentration sufficient to produce an odor may be a lethal concentration. Also, the sense of smell tires very quickly and becomes confused from the odors of these chemical agents, some of which are violent poisons in addition to being irritants. It should be borne in mind that under battle conditions, the odors of a chemical agent will be blended with, and either partially or totally masked by, other odors present, such as, nitrogen oxide fumes from gun fire, marsh or swamp odors, or the stench of putrefaction. It is very likely that two or more agents may be used simultaneously. For this reason, the effects on the body such as irritation of the eyes, nose, throat and prickling of the skin assist a trained observer in recognizing chemical warfare gases.

In testing for gas, the air should never be inhaled deeply. The student should note exactly what the agent smells like to him. There is more variation in odor perception than in any other faculty. Naturally it is to be expected that different men will describe the same odor differently. As the concentration of a gas is increased, the odor will become stronger and

more penetrating and will also change in characteristics. This, as well as the individual variation in perception, must be considered in identifying agents. Table 1 gives the characteristics of the different agents as they appear to the average person.

#### 12. USE OF THE SETS, GAS IDENTIFICATION, INSTRUCTIONAL

The Sets, Gas Identification, Instructional, M1, and the Navy HN, are identical in their use and are therefore discussed jointly in this section. When the instructional set is received, it is packed as described in chapter 2. The stopper of each bottle is completely covered and the bottle sealed with a heavy coating of paraffin. Personnel opening a new set or opening bottles which have been closed for a long time should protect themselves by wearing gas masks. Pressure is very apt to build up to considerable proportions in bottles that have been closed for a long time and may throw particles of contaminated charcoal into the opener's eyes. It is therefore advisable that bottles be opened by masked personnel some time before instruction is to begin. The agents in these bottles are actual agents and can cause serious injury to the handler. After the bottles have been opened, they should be immediately stoppered, after which no accumulation of pressure can be expected for another 24 hours. Bottles not in use should be kept stoppered at all times. *Under no circumstances are the contents of any bottle ever to be transferred to another bottle or container, or dumped except in accordance with the instructions in section 7.*

The sawdust and woodpulp may be removed but it is a good plan to retain this material especially if the set is to be transported from room to room or between buildings. Re-ship-

TABLE I—IDENTIFYING CHARACTERISTICS OF AGENTS

COMMON NAME OF AGENT	SYMBOL	ODOR	ODOR DETECTABLE AT	LETHAL CONCENTRATE FOR EXP. OF 10 MIN.	OTHER IMMEDIATE EFFECT
Mustard	H	Garlic; Horse Radish	.001 Mg/1	.135 Mg/1	None
Mustard (Purified)	HD	Garlic; Horse Radish	.001 Mg/1	.135 Mg/1	None
Nitrogen Mustards	HN	Very Slight Fish Odor	High Concentrations Only	?	None
Lewisite	L	Geraniums	.0014 Mg/1 (Crude)	.14 Mg/1	Sneezing; Nasal irritation
Ethylidick *	ED	Faint Fruity Odor; Biting in High Concentrations	.001 Mg/1	.16 Mg/1	None
Methylidick *	MD	Faint Fruity Odor; Biting in High Concentrations	.0008 Mg/1	.27 Mg/1	None
Phenylidick *	PD	Shoe Polish; Biting in High Concentrations	.001 Mg/1	.26 Mg/1	None
Phosgene	CG	Hay, Silage, or Green Corn	.004 Mg/1	.18 Mg/1	Thin White Cloud Produced Coughing; Tightness in Chest; Eye Irritation
Diphosgene *	DP	Hay, Silage, or Green Corn	.009 Mg/1	.35 Mg/1	Thin White Cloud Produced Coughing; Tightness in Chest; Eye Irritation
Chlorpicrin	PS	Fly Paper	.007 Mg/1	.67 Mg/1	Lacrimation; Vomiting
Hydrocyanic Acid *	AC	Almond Flavoring or Peach Kernels	.034 Mg/1	.23 Mg/1	None
Cyanogen Chloride *	CK	Pungent	.007 Mg/1	.8 Mg/1	Lacrimation
Arsine *	SA	Faint Garlic-like Odor	.1 Mg/1	.52 Mg/1	None
Adamsite *	DM	Irritating in Low Concentrations; Coal Smoke in High Concentrations	High Concentrations Only	3.0 Mg/1	Canary Yellow Smoke Haze; Headache; Vomiting; Nausea
Diphenyl Chlorarsine	DC	Irritating in Low Concentrations; Like Shoe Polish in High Concentrations	High Concentrations Only	1.0 Mg/1	Sneezing; Vomiting; Headache
Chloracetophenone	CN	Apple Blossoms	.0001 Mg/1	2.5 Mg/1	Lacrimation, Prickling of the skin.

\* These agents are not included in identification sets.

ment of this material must be made in the same type of packing it is in when received. The packing box itself is an excellent unit for storing the bottles when not in use as it can be wired closed to prevent tampering.

**Directions for Removing Stoppers:**

In case the glass stoppers are not readily removable from the bottles, one or both of the following procedures is recommended:

*First:* Remove the paraffined cloth from the top of the bottle and carefully remove all paraffin at the junction of the stopper of the bottle. This can be best accomplished by means

of a small knife blade or some sharp instrument. If the stoppers are not readily removed after the paraffin is taken off, hold the bottle in the left hand and apply strong pressure on one corner of the rectangular top of the stopper with the thumb, in a direction across the top of the bottle. At the same time pressure is applied, tap the stopper with a light object, such as the wooden handle of a small screwdriver, applying the stroke in the opposite direction to the force applied by the left thumb. Next, give the bottle a half turn so that the thumb pressure will be applied on alternate

corners and in opposite directions. By repeating this procedure several times, the stoppers of all bottles should be easily removed.

*Second:* A heavy twine string, about three feet long, is made fast to a stationary object and the string is wrapped once around the neck of the bottle, the loose end of the string being held taut in the left hand. The bottle, held in the right hand, is moved swiftly back and forth along the length of the string for about thirty seconds. The frictional heat produced by this method expands the neck of the bottle and allows the stopper to be easily removed.

When it is desired to smell the odor of any agent, the bottle should be placed in the left hand and brought near the nose, and the right hand used to fan the air across the mouth of the bottle toward the nose. At the same time air should be sniffed in and out of the nose, avoiding deep inhalations. If the odor is not obtained the first time, the bottle should be brought progressively closer until a distinct odor is obtained. *The nitrogen mustards, HN1 and HN3, have a very slight odor which students may not immediately perceive. Extreme care must be exercised that these agents are not inhaled deeply, or for too long a period.* If the odor is not immediately perceived, it is best to try again later.

Sniff bottles should be handled carefully at all times and not dropped or spilled. If a bottle containing H, L, HN1, or HN3, is spilled or broken, personnel in the immediate vicinity should make sure they have not been contaminated. If they have been contaminated, clothing should be removed and contaminated areas immediately treated with S-461 or S-330 protective ointment. The glass contents should be carefully gathered up by masked personnel wearing rubber gloves (and protective clothing if readily available) and all precautions taken to prevent further contamination. The deck, bulkhead, and all brushes and brooms should be decontaminated immediately with RH-195 solution. It is advisable for the instructor to have a tube of S-461 or S-330 always available. If a bottle containing DM, PS, CG, is spilled or broken, it should be cleaned up in the same manner except that washing down

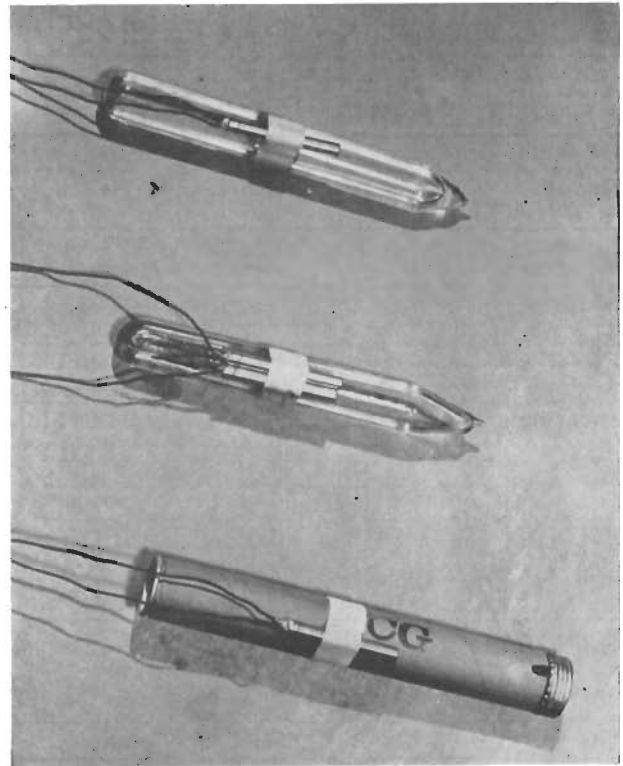


Figure 7—Tubes of agents with detonators attached

with soap and water suffices. After such an accident, the room or compartment should be thoroughly aired before again being used by personnel.

The instructional (sniff) sets are intended for use in indoor instruction prior to the use in the field of the Set, Gas Identification. Detonation, M1, or for refresher training aboard ship. During the indoor training period the sniff set should be placed where men can test for gas odors during intermissions of classroom exercises. After becoming familiar with the odors, the men should test their ability by covering the symbol, sniffing the odor, identifying it, and then checking. Gas lookouts or sentries should be given frequent opportunity to refresh their memory of the odors of the gases.

### 13. SAFETY PRECAUTIONS IN USING THE INSTRUCTIONAL SETS

1. Use a gas mask when opening bottles of new sets or bottles that have been closed for a long time.

2. If the stopper sticks follow the instructions for opening in Section 11. Do not pry or pound the stopper loose with a hammer or other heavy object.
3. Never inhale deeply. Just sniff. If the odor is not immediately perceived try again later. This applies to all agents but in particular to the nitrogen mustards (HN1 and HN3).
4. Handle bottles carefully. If an accident does occur, decontaminate immediately.
5. Never transfer the contents of a bottle. When necessary to dispose of bottles follow instructions in Section 7.
6. Always close bottles immediately after use and return to their containers.
7. Keep the box closed and away from unauthorized personnel when not in use.
8. Store the sets away from direct sunshine and heat.
9. If necessary to reship, ship only in the original or similar packing with sawdust, and apply the Poison gas label to the box.

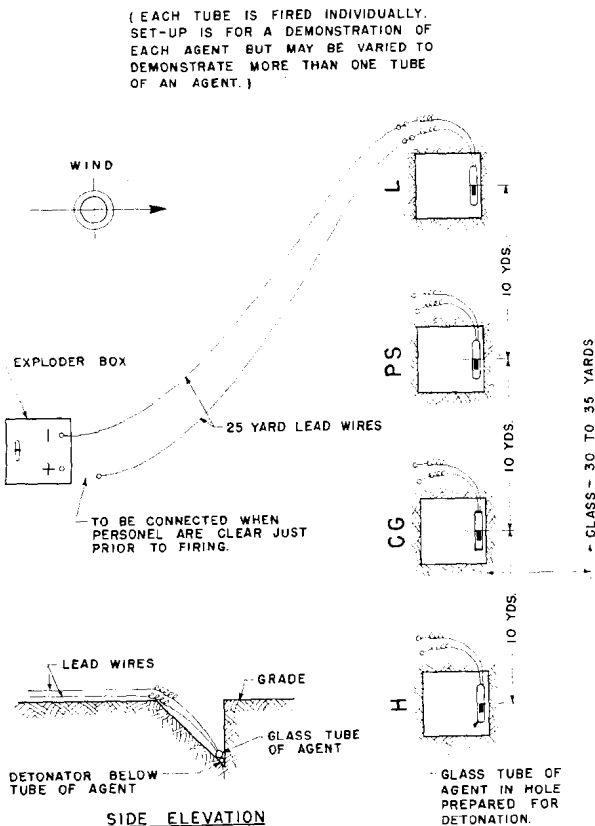


Figure 8—Diagram of Set-Up for Detonating Agents for Small Classes

#### 14. USE OF SETS, GAS IDENTIFICATION, DETONATION, M1

The Set, Gas Identification, Detonation, M1, is only used out of doors ashore. It is never used on board ships. The gas mask must invariably be worn when handling or preparing to fire any of the detonation tubes. Requests for these sets are to be made by letter in accordance with established procedures for Chemical Warfare training material. Partial replacements are never to be requested and the empty shipping cylinders should always be returned where possible to the Eastern Chemical Warfare Depot, Edgewood Arsenal, Maryland.

The accessories set described in Chapter 2 is issued for use with the detonation set and should be requested as needed. Detonator, Electric, No. 8, (see Figure 4) is the only detonator (blasting cap) authorized for use with this set and should be requested in multiples of seventy (70) as needed. A weaker detonator may fail to give proper dispersion and a stronger detonator may scatter the contents in-

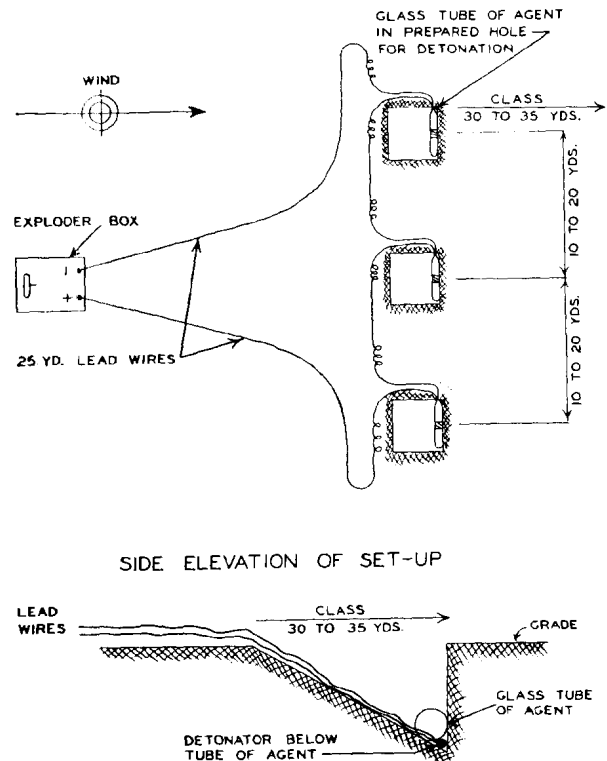


Figure 9—Diagram of Detonation of Agent Set-Up for Field Identification for Large Classes

cluding the glass fragments too widely. Therefore, it is mandatory that only the Detonator, Electric, No. 8, be used with this set.

The detonators are to be fastened to the glass tubes containing H, L, and PS, and to the cardboard container of the CG filled glass tubes (see Figure 7). (Never remove the glass tube of (CG) from the cardboard container as internal pressures may, as a result of heat from the hand, build up sufficiently to burst the tube). Some detonators may be shipped with a small lead disc shunt (see Figure 8) shorting the detonator leads just in front of the detonator. This disc must be removed in order that the current may fire the detonator. It should be removed just prior to attaching to the tube. Connections are made as shown in Figure 7. Hook-up with the exploder box (Figure 6) is shown in Figure 8, for small classes, and Figure 9 for larger classes. The tubes with detonators attached are to be placed in small pits about 9" deep as indicated in Figure 8. Care should be exercised to keep the detonators on the underside of the glass or cardboard tube to insure the discharge of the agent into the air.

The number of samples of an agent necessary to give a satisfactory demonstration and test will be determined by the officer in charge of the demonstration. Under normal weather conditions, one sample is considered sufficient for a group of twenty persons. For larger groups, or for demonstrations under adverse weather conditions, a larger number of samples of a particular agent will be required. When two or more tubes are fired at once, the firing line should be at right angles to the wind direction. When firing two or more tubes simultaneously, they should be attached in series as shown in Figure 9, care being taken that the capacity of the blasting machine is not exceeded. When firing in series, detonators of the same manufacturer should be used in order that the resistance of each detonator is equal.

The exploder box should be placed about 25 yards upwind from the firing line. The class or observers should be placed from 30 to 40 yards downwind. A small portable wind-vane will greatly aid in placing the students. The stronger the wind, the farther away the stu-

dents should be placed. The wiring should not be completed until all personnel are clear. All circuits should be tested with a circuit tester or blasting galvanometer if one is available (galvanometers are not furnished by the Bureau of Ordnance for this purpose). The last wire is attached to the blasting machine by the operator just prior to pushing the plunger or turning the handle. The blasting machine should be activated as strongly as possible to insure an adequate current.

## 15. DEMONSTRATION OF AGENTS

Use one detonator only on the cardboard tube containing the glass tube of phosgene (CG), on the glass tube of chlorpicrin (PS), and on the Lewisite (L) glass tube; two detonators are needed for mustard (H). Never attach the detonators to the cardboard tube containing the glass tube of mustard or Lewisite. The fragments of cardboard will be contaminated and may cause injury on contact.

When the gas tubes are detonated, small puffs of smoke are produced by the detonators. The gas cloud is usually colorless, but moves along with the smoke. Have the observers pass at right angles through the cloud, stop and bend down so as to get a good concentration and sniff for gas. Do not inhale deeply.

Have a metal spade or shovel handy and take a sample of earth from the detonation hole. Then have each student who did not get a good impression of the odor pass by and sniff the odor of the agent given off by the earth. This earth is contaminated and should be handled with caution. Do not allow the students to approach within 15 yards down wind of the holes as the area may be contaminated.

After a demonstration, decontaminate the area of the holes with bleach and fill in the detonation holes after raking into them the detonator leads and any particles of glass. In handling the lead wires, care must be taken as they may have become contaminated. Rubber gloves should be worn. The location of the holes should be marked so that the same hole is not redug for a later demonstration.

The Kit, First Aid, (gas casualties) Stock Number S2-1058 should be kept on hand for

every demonstration. Should any personnel become contaminated, either the S-330 or the S-461 protective ointment should be applied immediately.

#### 16. SPECIAL PRECAUTIONS IN USING THE DETONATION SET

1. Do not choose as the site for the exercise a place where children are liable to play later.
2. Do not remove the CG tube from its cardboard tube. It may explode.
3. Do not leave tubes in direct sunshine too long.
4. Detonators are dangerous. Do not carry

them in pockets. Handle gently, keep them cool and out of direct rays of sun.

5. Do not use detonators that are corroded, or show signs of having been wet.

6. In case of misfire, wait at least 5 minutes before approaching. It is not necessary to remove detonator, but merely tape on another. Any dud detonators remaining should be exploded after the exercise by taping to a good detonator.

7. Do not smoke while handling detonators.

8. In firing tubes in series, do not use detonators of different manufacture.

9. Do not stow detonator in same compartment with or near radio apparatus or antenna leads.

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