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IN REPLY REFER TO

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**THE CHEMICAL WARFARE JOB AID**

1. Purpose: The Chemical Warfare Job Aid has been published to provide a quick reference of the following: chemical agents, Saratoga protective overgarment, M295 decon kit, and the M42 Mask donning procedures.
2. Scope: This job aid is designed for all Marines serving in a field environment.
3. Applicability: This job aid is intended as a guide only. It is designed for Marines of all grades and MOSs.
4. Recommendations: Comments and recommendations on the contents of this job aid are invited and will aid in subsequent revisions.

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# CHEMICAL WARFARE

## Classification of Chemical Agents

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### Three Classifications

There are three classifications of chemical agents:

- Physical state
  - Tactical use
  - Physiological use/action
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### In This Job Aid

The following topics are discussed in this job aid.

Topic	See Page
Classification of Chemical Agents	1
Characteristics of Chemical Agents	4
Characteristics of Toxic Agents	5
Characteristics of Non-Toxic Agents	11
Saratoga Chemical Protective Overgarment	15
M295 Decontamination Kit	16
M42 Mask Donning Procedures	17

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### Physical State

Chemical agents may exist as

- Solids
- Liquids
- Gases

**Note:** The normal physical state of chemical agents is 60° Fahrenheit or 29° Centigrade.

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### Tactical Use

Chemical agents are grouped according to their tactical uses.

- Toxic agents produce casualties.
  - Incapacitating agents produce temporary psychological and/or mental effects.
  - Riot control agents produce temporary irritating or incapacitating effects.
  - Training agents are used for training purposes only.
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## Classification of Chemical Agents, Continued

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**Physiological  
Use/Action**

Only toxic chemical and riot control agents are classified according to their physiological actions. The table below lists the physiological effects of the chemical agents in these groups.

<b>Agent</b>	<b>Physiological Effects</b>
Nerve	Affects body functions through action of the nervous system
Blister	Inflammation, blisters, and general destruction of tissue
Blood	Interferes with normal transfer of oxygen from lungs via the blood to body tissue
Choking	Irritation and inflammation of bronchial tubes and lungs
Riot Control	Temporarily irritates the eyes, bronchial tubes, and lungs

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## Classification of Chemical Agents, Continued

### Hazards

The table below lists the hazards of chemical agents caused by different factors.

Factor	Influence
Exposure	Through breathing (inhalation), the skin and eyes (absorption) Drink and food contaminated by agents (ingestion) Breaching of the full protective ensemble
Persistency	<ul style="list-style-type: none"> <li>• Ranges from a few seconds to months</li> <li>• Factors affecting persistency are               <ul style="list-style-type: none"> <li>• Specific agent characteristics</li> <li>• Weather</li> <li>• Method of dissemination</li> <li>• Droplet size</li> <li>• Characteristics of contaminated surfaces and terrain</li> </ul> </li> </ul> <p><b>Note:</b> The term persistent describes the length of time chemical agents remain a threat in a targeted area.</p>
Effects of Weather	<p>Temperature, wind, humidity, precipitation, and atmospheric stability</p> <ul style="list-style-type: none"> <li>• High winds and heavy rains reduce the contamination hazard.</li> <li>• Lack of wind, overcast skies, and moderate temperature favor persistence.</li> </ul>
Effects of Surface and Terrain	<p>Agent clouds tend to follow the terrain.</p> <ul style="list-style-type: none"> <li>• Rough terrain retards cloud movement.</li> <li>• Flat countryside allows for a uniform, unbroken cloud movement.</li> <li>• Vegetated areas are more easily contaminated than barren terrain because vegetation picks up the agent.</li> <li>• Liquid agents soak into porous surfaces making evaporation slower than non-porous surfaces.</li> </ul>

# Characteristics of Chemical Agents

**Types** The table below provides an overview of chemicals typically used by military forces.

Agent	Chemical Properties	Physical Properties	Symptoms
Nerve	G-series: <ul style="list-style-type: none"> <li>• Tabun (GA)</li> <li>• Sarin (GB)</li> <li>• Soman (GD)</li> </ul> V-agents: <ul style="list-style-type: none"> <li>• O-ethyl methyl phosphonothiolate (VX)</li> </ul>	<ul style="list-style-type: none"> <li>• Vapors, liquids or solids</li> <li>• Odorless to fruity or camphor odor</li> </ul>	<ul style="list-style-type: none"> <li>• Pinpointing of pupils</li> <li>• Sweating</li> <li>• Breathing problems</li> <li>• Muscle weakness</li> </ul>
Blister	Mustard (H) Distilled Mustard (HD) Mustard Mixture (HT) Nitrogen Mustard (HD)	<ul style="list-style-type: none"> <li>• Vapors, liquids or solids</li> <li>• Garlic or fishy/ mustard odor</li> </ul>	<ul style="list-style-type: none"> <li>• Burns or blisters any tissue it contacts</li> <li>• Breathing problems</li> </ul>
Blood	Cyanogen Chloride (CK)	<ul style="list-style-type: none"> <li>• Vapor or aerosol</li> <li>• Persistency generally only seconds to minutes</li> </ul>	<ul style="list-style-type: none"> <li>• Headache</li> <li>• Breathing problems</li> <li>• Convulsion</li> <li>• Bluening of skin</li> </ul>
Choking	Phosgene (CG)	<ul style="list-style-type: none"> <li>• Vapor form</li> <li>• Smells like new mown hay or grass</li> </ul>	<ul style="list-style-type: none"> <li>• Cough</li> <li>• Breathing problems</li> </ul>
Incapacitating	CNS depressant <ul style="list-style-type: none"> <li>• 3-quinuclidinyl Benzilate (BZ)</li> </ul> CNS stimulants	Compounds	Alters <ul style="list-style-type: none"> <li>• Memory</li> <li>• Problem-solving</li> <li>• Attention</li> <li>• Comprehension</li> </ul>
Riot Control	Vomiting agent <ul style="list-style-type: none"> <li>• Adamsite (DM)</li> </ul> Tear gas <ul style="list-style-type: none"> <li>• O-chlorobenzylidene-malononitrile (CS)</li> <li>• Chloroacetophenone (CN)</li> </ul>	Aerosols	<ul style="list-style-type: none"> <li>• Burning sensation in nasal passages</li> <li>• Tearing</li> <li>• Coughing</li> <li>• Nausea</li> <li>• Vomiting</li> </ul>

# Characteristics of Toxic Agents

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- Nerve Agents**
- Most lethal of all agents
  - Symptoms and death within minutes
  - Affects the nervous system
  - Persistency can range from minutes to days
  - Enters into the body easily
- 

- Groups**
- The two groups of nerve agents are
- G-series
  - V-agent
- 

- G-Series Types**
- G-series types are
- Tabun (GA)
  - Sarin (GB)
  - Soman (GD)
- 

- G-Series Properties**
- The physical properties of the G-agents are similar.
- Colorless to brownish liquids giving off a colorless vapor.
  - All are volatile.
  - GA has a faint fruit odor when impure; none when pure.
  - GB has almost no odor in the pure state; and a camphor odor when impure.
  - GB is the most volatile of the series.
- 

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## Characteristics of Toxic Agents, Continued

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### **V-Agent Properties**

The physical properties of V-agents are listed below.

- Colorless and odorless liquid
  - Less volatile than G-agents
  - More persistent than G-agents
- 

### **Type**

V-agent type is o-ethyl methyl phosphonothiolate (VX).

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### **Symptoms**

Symptoms appearing minutes after exposure may be

- Pinpointing of pupils
- Dimness of vision
- Excessive sweating
- Running nose
- Tightness of chest

Followed by

- Twitching
  - Jerking
  - Staggering
  - Headache
  - Confusion
  - Drowsiness
- 

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## Characteristics of Toxic Agents, Continued

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### **Blister Agents**

Blister agents

- Are delayed-acting
  - May not be evident for up to 4 hours after exposure
  - Attack the respiratory system
  - Are absorbed through the skin, first affecting the moist parts of the body
  - Are a drop the size of a pinhead that will produce a blister the size of a quarter
- 

### **Types**

There are four types of blister agents.

- Mustard (H)
  - Distilled Mustard (HD)
  - Mustard Mixture (HT)
  - Nitrogen Mustard (HN)
- 

### **Mustard (H) Physical Properties**

- Dark colored liquid containing about 10% sulfur impurities
  - Pronounced odor of garlic
  - Persistent for 3 or 4 days in warm weather and several weeks in winter
- 

### **Distilled Mustard (HD) Physical Properties**

- Basic properties are similar to H.
  - Less odor and a greater blistering power than H.
  - Injuries heal slower and are more susceptible to infection than burns of similar intensity.
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## Characteristics of Toxic Agents, Continued

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**Mustard  
Mixture (HT)  
Physical  
Properties**

- T is a yellowish liquid sulfur and chlorine compound
  - HT is a mixture of 60% HD and 40% T
  - Similar in odor and structure to HD
  - More persistent than H and HD during the summer and winter
  - Has a lower freezing point than HD
  - Low volatility makes concentrations in the field difficult to detect
- 

**Nitrogen  
Mustard (HN)  
Physical  
Properties**

- Oily, colorless, or pale yellowish liquid
- Odorless to a faint, fishy odor
- Volatility varies with the particular compound

**Note:** There are three classes of HN—HN-1, HN-2, and HN-3. Only HN-1 and HN-3 are employed for military use.

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**Symptoms**

Symptoms may be

- Nausea and vomiting
  - Stinging sensation upon contact
  - Burns or blisters on exposed tissue
  - Red, watering eyes
  - Blurred vision
  - Light sensitivity
  - Blindness
- 

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## Characteristics of Toxic Agents, Continued

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### Blood Agents

- Rapid acting
  - Inhalation is the primary method of entry
  - Prevents the blood from transferring oxygen to body cells
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### Types

There are two types.

- Hydrocyanic acid (AC)
  - Cyanogen chloride (CK)
- 

### Hydrocyanic Acid (AC)

Properties of AC include

- Attacking the respiratory system
  - Dying within a few breaths (possible)
- 

### Cyanogen Chloride (CK) Properties

- Effects are similar to AC
  - Has a local irritant effect on the eyes, respiratory tract, and lungs
  - Stimulates, then rapidly paralyzes the respiratory system
- 

### Symptoms

Symptoms may be

- Giddiness
  - Headache
  - Confusion
  - Nausea
  - Rapid or difficulty breathing
  - Cramps
  - Loss of consciousness
  - Bluening of skin
- 

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## Characteristics of Toxic Agents, Continued

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- Choking Agents**
- Do not absorb through the skin
  - Cause lungs to fill up with fluid
  - Victims may appear symptom-free for 2 to 24 hours
  - Persistency varies
- 

- Phosgene (CG)** Phosgene (CG) is the most widely used choking agent.
- Colorless gas
  - Produces an odor resembling new mown hay or grass
- 

- Symptoms** Symptoms may be
- Coughing
  - Choking
  - Tightness of chest
  - Nausea
  - Headache
  - Watering eyes
  - Breathing discomfort
  - Fatigue
-

# Characteristics of Non-Toxic Agents

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## Incapacitating Agents

- Any compound that can interfere with the ability to perform military duties
- Alter or disrupt the central nervous system
- Danger to life at extremely high doses

**Note:** Toxic agents can produce incapacitating effects at low doses. However, these agents are not classified as incapacitating.

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## Types

Two of the most widely used are

- 3-quinuclidinyl Benzilate (BZ); classified as depressants
  - Stimulants (CNS)
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## Depressants (BZ)

- Depresses or block the central nervous system by interfering with the transmission of information.
  - In high doses they completely destroy the ability to perform any military task.
  - Disturbs the higher integrative functions of memory, problem solving, attention, and comprehension
- 

## Symptoms

Symptoms may be

- Failure to obey orders, confusion, erratic behavior
  - Dryness of mouth, blurred vision, pupil dilation, slurred or nonsensical speech
  - Increased heart rate, hypertension, stomach cramps, vomiting, tremors
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## Characteristics of Non-Toxic Agents, Continued

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**Stimulants  
(CNS)**

Cause excessive nervous activity, often by “boosting” or increasing transmission of impulses to nerve endings.

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**Symptoms**

Symptoms may be

- Indecisiveness
  - Overloaded decision-making capability
- 

**Riot Agents**

- Temporarily incapacitate without being lethal
  - Produce transient effects, which disappear within minutes of removal from exposure
  - Rarely require medical treatment
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**Types**

Based on their physiological effects, riot agents are divided into two groups.

- Vomiting agents
  - Tear agents
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## Characteristics of Non-Toxic Agents, Continued

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**Vomiting Agent** Adamsite (DM) is

- The agent mostly used by the military
  - Rapid acting
  - Non-persistent
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**Symptoms** Initial symptoms may be

- Burning sensation in nose and sinus
- Severe frontal headache

Followed by

- Eye irritation
  - Tears
  - Uncontrollable coughing
  - Violent sneezing
  - Drooling
  - Nausea
  - Vomiting
- 

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## Characteristics of Non-Toxic Agents, Continued

### Tear Gases

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Gas	Characteristics
O-chlorobenzoylidene-malonitrile (CS)	<ul style="list-style-type: none"><li>• More stable and potent than CN</li><li>• Less toxic than CN</li><li>• Primary used outdoors to disperse crowds</li><li>• White crystalline solid</li><li>• Employed by burning, exploding and aircraft spraying</li><li>• Has a pepper-like odor</li><li>• Warm, moist skin is susceptible to irritation</li><li>• Easily inactivated by water</li></ul>
Chloracetophenone (CN)	<ul style="list-style-type: none"><li>• White solid powder</li><li>• Primarily used indoors to force people outside</li></ul> More difficult to inactivate by water

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### Symptoms

Symptoms may be

- Eye irritation
  - Irritation in the nose, mouth, throat, and airways
  - Coughing
  - Difficult breathing
  - Stinging sensation
  - Redness and blisters
-

# Saratoga Chemical Protective Overgarment

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## General Information

The Saratoga suit is a reusable, two-piece, camouflage suit. It provides protection in all environments and conditions and is compatible with the gloves, boots, and mask. The suit consists of a coat and trousers.

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## Features

The coat features

- Full-length zippered opening covered by a single protective flip
- Integrated hood
- Pile sleeve closures

The trousers features

- Adjustable waist tabs and suspenders
  - Closures on the lower outside section of each leg
- 

## Technical Data

The suit employs spherical carbon technology to provide effective body protection from all known chemical/biological warfare agents. In addition,

- It offers the best possible flow conditions for body heat dissipation so the suit is as cool as possible.
- The outside layer of material is cotton rip stop that has been corpel treated.
- In a non-NBC contaminated environment, it may be laundered up to four times during its service life.

### Notes:

- Properly discard after exposure to chemical agents in accordance with FM 3-5/FMFM 11-10.
  - FM 3-4/FMFM 11-9 provides information on protective capabilities.
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## M295 Decontamination Kit

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**General Information**

The M295 will replace the M280 Decontaminating Kit. It is used like the M280 to decon the mask, hood, gloves, footwear, weapon, helmet, and load bearing equipment (personnel individual equipment).

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**Features**

The M295 consists of a pouch containing four individual wipedown mitts, each within a soft, protective packet. The pouch assembly is designed to fit comfortably within a pocket of the cammies.

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**Technical Data**

The M295 employs the sorptive resin technology. The resin technology is superior to the M258A1 and M280 liquid-based kits.

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## M42 Mask Donning Procedures

**Don and Clear** The table below lists the donning and clearing procedures for the M42 Mask.

<b>Step</b>	<b>Action</b>
1	Stop breathing and close eyes.
2	Remove helmet if worn, and place between knees or on top of rifle.
3	Remove glasses.  <b>CAUTION:</b> If you are wearing contact lenses, do not remove them as this may cause contamination to your eyes.  If you are going to wear contact lenses, ensure the mask does not have the eyeglass inserts inserted.
4	Open carrier.
5	Grasp face-piece and remove from carrier.
6	Put chin in chin pocket and press face-piece snugly against the face.
7	Cover openings at the bottom of the inlet valve and breathe out so that air can escape from around face-piece.  <b>CAUTION:</b> Ensure there are no kinks in the hose at this time.
8	Cover inlet port of canister with palm of hand and breathe in. Face-piece should collapse against your face.  <b>Note:</b> If the face-piece does not collapse, check for obstructions around mask.
9	Grasp tab in center of harness and pull over head.
10	Hold the face-piece in place with one hand and adjust the strap with the other.  <b>Note:</b> Ensure the head pad is centered on the back of the head.
11	Repeat steps 7 and 8 to clear face-piece and check for leaks.
12	Resume normal breathing.