



WHO



IMO



ILO

**MEDICAL FIRST AID GUIDE
FOR USE IN
ACCIDENTS INVOLVING
DANGEROUS GOODS
(MFAG)**

1994 Edition

INTERNATIONAL MARITIME ORGANIZATION

**MEDICAL FIRST AID GUIDE
FOR USE IN ACCIDENTS
INVOLVING DANGEROUS
GOODS (MFAG)**

**Chemicals Supplement to the International
Medical Guide for Ships (IMGS)**

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**INTERNATIONAL MARITIME ORGANIZATION
London, 1994**

FOREWORD

The **IMO/WHO/ILO** *Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG)* is the Chemicals Supplement to the *International Medical Guide for Ships (IMGS)** which is published by the World Health Organization (WHO), Geneva.

This Guide takes into account all amendments to the *International Maritime Dangerous Goods (IMDG) Code* up to and including Amendment 27-94 and will be further amended as and when necessary.



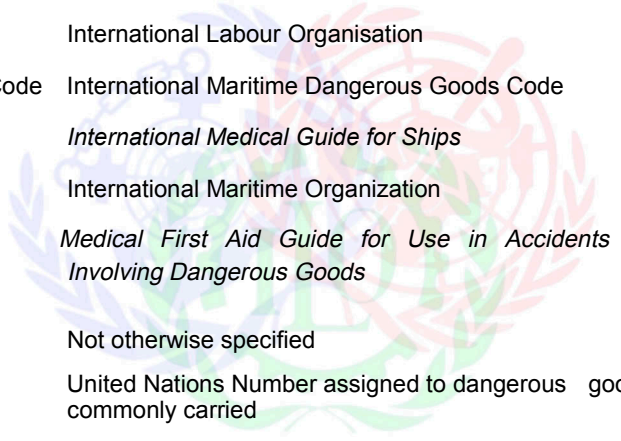
* *International Medical Guide for Ships*, 2nd edition (World Health Organization, Geneva, 1988), ISBN 924 154231 four.

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ABBREVIATIONS



BC Code	Code of Safe Practice for Solid Bulk Cargoes
EmS	Emergency Schedule
ILO	International Labour Organisation
IMDG Code	International Maritime Dangerous Goods Code
<i>IMGS</i>	<i>International Medical Guide for Ships</i>
IMO	International Maritime Organization
<i>MFAG</i>	<i>Medical First Aid Guide for Use in Accidents Involving Dangerous Goods</i>
N. O. S.	Not otherwise specified
UN No.	United Nations Number assigned to dangerous goods most commonly carried
WHO	World Health Organization

1 INTRODUCTION

1.1 The [IMO/WHO/ILO Medical First Aid Guide for Use in Accidents Involving Dangerous Goods \(MFAG\)](#) is supplementary to the [ILO/IMO/WHO International Medical Guide for Ships \(IMGS\)](#). The advice given in this Guide refers to the substances, materials and articles covered by the *International Maritime Dangerous Goods (IMDG) Code*, and the materials covered by Appendix B of the *Code of Safe Practice for Solid Bulk Cargoes (BC Code)*. This Guide should be used in conjunction with the information provided in the *IMDG Code*, the *BC Code* and the *Emergency Procedures for Ships Carrying Dangerous Goods (EmS)*. It is intended to provide advice necessary for diagnosis and treatment of chemical poisoning within the limits of the facilities available on board ship.

1.2 Information on the treatment of illnesses, which are of a general nature and not predominantly concerned with chemical poisoning may be found in the [IMGS](#).

1.3 Minor accidents involving chemicals do not usually cause severe effects provided that the appropriate first aid measures described in this Guide are taken. Although the number of reported serious accidents is small, accidents involving those chemicals which are toxic or corrosive may be dangerous, and must be regarded as being potentially serious until either the affected person has completely recovered, or medical advice to the contrary has been obtained. Any person suffering from chemical poisoning should be seen by a doctor at the next port of call.

1.4 Within this Guide, the chemicals are grouped into tables according to their chemical properties ([section 9](#)). There may be a variable degree of toxicity within a group. Where a chemical or chemical solution or mixture is not specifically listed in the *IMDG Code*, and is therefore declared by the shipper as an N. O. S. (not otherwise specified) or generic entry, it has been assigned to a table which is consistent with the toxic medical effects to be expected from poisoning by that chemical. For such entries shippers may declare different numbers from those indicated in the [IMDG Code](#) if, to their knowledge, such numbers are more appropriate. Occasionally, it is impossible to allocate a table at all because of the wide variety of possible medical effects, and general guidance has been given on appropriate treatment for those situations.

1.5 The tables themselves give general information about the particular group of chemicals, and indicate the toxic effects likely to be encountered. The treatment recommended in this Guide is specified in either the appropriate section or the appropriate table. However, differences exist between countries on certain types of treatment and where these differences occur they are indicated in the relevant national medical guide.

1. 6 In those circumstances where it is suspected, but not known for certain, that a patient is suffering from chemical poisoning, reference should be made to [section 4 \(Diagnosis of Poisoning\)](#) of this Guide.

2 HOW TO USE THIS GUIDE

2. 1 The General Index (alphabetical) of Dangerous Goods of the IMDG Code includes references to [EmS](#) numbers and MFAG Table numbers.

2. 2 As the United Nations Number ([UN No.](#)) has already been assigned to virtually all dangerous goods carried by all modes of transport and is used on shipping documents, an additional Numerical Index of [UN Nos.](#) (Table of UN Numbers with corresponding [IMDG Code](#) Page, [EmS](#) and [MFAG](#) Table numbers) is also included in the [IMDG Code](#).

2. 3 If the proper shipping name (correct technical name) or the UN No. of the particular chemical is known, reference to either the alphabetical index or the numerical index of the [IMDG Code](#), as appropriate, will give the [MFAG Table No.](#) of the chemical.

2. 4 If the name or the [UN No.](#) is not known but the type of chemical is known, the appropriate [MFAG](#) Table No. can be identified by consulting the index of chemical tables in [section 10](#) of this Guide.

2. 5 Examples of the entries for FORMIC ACID in the indexes of the [IMDG Code](#) are given hereunder:

. 1 General Index

SUBSTANCE or ARTICLE	IMDG CODE PAGE	UN No.	CLASS	Packaging Group	Subsidiary Risk Label (s)	EmS No.	MFAG Table No.
FORMIC ACID	8177	1779	8	II	-	<u>8-05</u>	700

.2 Numerical Index

UN No	... 9	
177.	8177	IMDG Code Page No.
	<u>8-05</u>	EmS No.
	700	MFAG Table No.

2. 1 The numerical index has been compiled to enable users who know the **UN No.** of a given chemical to find the corresponding page in the IMDG Code (IMDG Code Page No.), the Emergency Schedule (**EmS No.**) and the Medical First Aid Guide (**MFAG Table No.**).
2. 2 For the purposes of the numerical index, the **UN No.** has been broken down into two parts. The three-digit figures in the left-hand column of the index indicate the first three digits of the **UN No.** The single-digit figures shown in the top line of the index indicate the last digit of the **UN No.**
2. 3 The numbers of the **IMDG Code Page**, the **EmS** and the **MFAG Table** where the information for a chemical covered by a given **UN No.** appears will be found in the box at the intersection of the horizontal row and the vertical column corresponding to the two parts of the **UN No.** as described above.

3 MEDICAL ADVICE RELATING TO THE DANGERS OF THE CARRIAGE OF CHEMICALS BY SHIPS

3. 1 The officers and crew of a ship regularly carrying chemicals ought to have been trained in the general hazards involved and should be aware, therefore, of the necessary precautions to be observed. Equally they should have been instructed about the safety rules and the first aid procedures to be used in case of an accident.
3. 2 In the case of other ships it is essential that, before a chemical is handled, the officers and crew involved should be advised by the master of the hazards of the particular chemical and the action to be taken in the event of an accident. The dangers of smoking, drinking, taking food or being under the influence of alcohol or drugs whilst handling chemicals should be emphasized.
3. 3 If, during the handling of chemicals, any person shows signs or symptoms suggestive of poisoning, he should betaken off the work, given treatment in accordance with the advice given in this Guide and seen as soon as possible by a doctor. In the case of poisoning whilst at sea, medical advice by radio should be sought if so advised in this Guide, but in any event the patient should be seen by a doctor at the next port of call. It should also be remembered that help might also be available from another ship if there is one within the vicinity with a physician or other trained person on board.
3. 4 It is important to decide on priorities of treatment when there have been more than one route of exposure. In the tables of **section 9** the phrase **"IMMEDIATE ACTION IS REQUIRED"** has been used to indicate the route of exposure that should be treated first. It will rest with the person giving treatment to decide in individual cases whether the effects of another

route of exposure have more priority because of threat to the life of the patient.

4 DIAGNOSIS OF POISONING

4.1 General principles

The diagnosis of poisoning may be simplified if one or more of the following factor points to the probable cause:

- The circumstances of the incident, e. g. a leakage of chemicals.
- The nature of the illness, and its relationship in time to recent exposure to a chemical.
- More than one person are involved and all develop a similar illness.

It must be realized, however, that:

- The effects of some poisons resemble those of natural illness, e. g. vomiting and diarrhoea, or collapse.
- Because a ship is carrying a cargo of chemicals it does not follow that the cause of the illness is that cargo, and, unless there is evidence of a leakage, it is improbable.
- Different individuals may be exposed to the poison at different times, or to a different extent during a single episode, and they may as a result become ill at different times or to differing degrees.
- Individuals react differently to poisons according to their health, constitution, and to how much of the poison they were exposed.

In a typical case of poisoning, three stages of the illness may be distinguished:

. 1 The latent stage - This is the interval of time from the moment of entry of a poison into the body until the first symptoms (feelings) or signs are apparent. These usually occur rapidly after exposure, but in some cases there may be a delay of several hours before they develop. In very rare instances with specific chemicals, the symptoms and signs may be delayed for some days. If the latter is the case, it will be indicated in the appropriate [table of section 9](#).

. 2 The active stage - The signs and symptoms of the poisoning are apparent. In many cases these are common to a great number of different chemicals which therefore have to be treated in a general way. If there are specific signs and symptoms associated with a particular chemical, these will be mentioned in the appropriate [table of section 9](#). Chemicals can either act locally at the point of contact with the body or be absorbed

from the point of contact, causing more general symptoms. This is particularly true of chemicals which can cause local skin irritation, but are also absorbed through the skin to produce general, or specific, toxic symptoms and signs. The same principle is true for other routes of entry into the body, although general symptoms are less likely to occur with eye contact.

The main routes of exposure are:

- Skin contact.
- Eye contact.
- Inhalation - into the mouth, nose, throat and lungs.
- Ingestion - swallowed chemicals.

The general symptoms of poisoning include:

- Headache.
- Nausea and vomiting.
- Drowsiness.
- Changes in mental behaviour.
- Unconsciousness.
- Convulsions.
- Pain.

Signs of severe poisoning are:

- A rapid and weak pulse.
- Grey or blue colour of skin.
- Severe difficulty in breathing.
- A prolonged period of unconsciousness.

3 The late stage - The signs and symptoms usually resolve after a few hours in the majority of incidents, particularly if the degree of exposure is small. If a greater amount is absorbed or the period of exposure is prolonged, or the chemical is very toxic, symptoms may persist for some hours or even days. The patient's condition may deteriorate due to complications, the most common of which are:

- Asphyxia (see 6. 1. 1).
- Pulmonary oedema (see 6. 1. 2).

- Bronchitis (see 6. 1. 3).
- Pneumonia (see 6. 1. 4).
- Circulatory collapse (see 6. 2. 1).
- Heart failure (see 6. 2. 2).
- Liver failure (see 6. 4. 5).
- Kidney failure (see 6. 5. 1). Death may occur despite treatment.

4. 2 *Specific diagnosis*

It is important, if possible, to identify the chemical involved. If it is known, the appropriate table in [section 9](#) will list the signs and symptoms together with the treatment.

If the chemical is not known, the first thing to do is to look carefully at the patient, having determined the main route of exposure ([see 4. 1. 2](#)), and decide whether it was:

. 1 *Corrosive (irritant)*

There will be severe pain and redness, blistering or burns where the chemical made contact.

Examine the mouth, lips, chin and underneath contaminated clothing. If a corrosive chemical is suspected, this should be treated as appropriate to the type of exposure.

The patient may develop:

- Pulmonary oedema ([see 6. 1. 2](#)).
- Circulatory collapse ([see 6. 2. 1](#)).
- Bleeding from the intestine ([see 6. 4. 3](#)).
- Severe chemical burns ([see 6. 7](#)).

. 2 *Non-corrosive*

The signs above are missing. The chemical may nevertheless be dangerous, and symptoms and signs as described in [4. 1](#) should be looked for.

Remember that many gases, e. g. carbon monoxide, carbon dioxide and refrigerants, seldom have a smell to warn you of their presence.

General first aid measures should be used in treatment as appropriate to the area of the body affected ([see section 5](#)).

4.3 N. O. S. and generic entries

MFAG Table numbers have been allocated to N. O. S. and generic entries where it is possible to determine the main chemical hazards of the substances to be carried under these entries. For certain N. O. S. and generic entries this is not possible because the specific chemical hazards may vary widely. In addition, N. O. S. and generic entries may be used for unlisted specific chemicals, or mixtures, or solutions of chemicals, or other substances, materials or articles, falling under the classification criteria of the [IMDG Code](#).

For the purposes of documentation and marking of packages containing dangerous goods shipped under one of the N. O. S. or generic entries listed in 7.1.13 of the General Introduction, the [IMDG Code](#) requires that the selected N. O. S. or generic entry be supplemented by a recognized chemical name of the substance causing the hazard.

If the chemical name is not familiar to the user or if the shipper has not declared the identity of the chemical, treat the casualty according to 4.2 above. Meanwhile try to identify and obtain information on the nature of the chemical by obtaining radio advice from the shipper or other sources. Until information is obtained, assume that the substance is of high toxicity and provide appropriate protection for emergency and treatment personnel.

5 FIRST AID

5.1 Introduction

First aid aboard ship is the treatment necessary for minor casualties or to enable a casualty to be transported to the ship's hospital or to a cabin for further treatment as appropriate to the conditions described in [section 6](#).

Anyone aboard ship may find a casualty. The action priorities, the positioning of an unconscious casualty and the giving of artificial respiration are basic knowledge that any seaman should possess in order to save life until more qualified help arrives. Emergency treatment for the different routes of exposure to a chemical, as set out in [section 8](#), should be studied in order to be familiar with the principles in the event of an accident.

It is important that every seafarer should know what to do at once in case of an accident.

It is the responsibility of the master to ensure that **NO ONE ENTERS** an enclosed space unless he is a trained member of a rescue team acting upon instruction.

Casualties who have been poisoned by a chemical should rest quietly in a cabin and be observed for at least 24 hours, in case any complications as listed in [section 6](#) develop.

5.2 Priorities

On finding a casualty:

- Look after yourself; do not become the next casualties.
- If necessary, remove the casualty from danger or remove danger from the casualty (but see note below on a casualty in an *enclosed space*).
- Use a breathing apparatus if there is any suspicion of toxic gases or fumes in the area.

IF ONLY ONE UNCONSCIOUS CASUALTY (irrespective of the total number of casualties):

- Give immediate treatment to the unconscious casualty only; and
- then send for help. *IF MORE THAN ONE UNCONSCIOUS CASUALTY:*
- Send for help; and*
- then start giving appropriate treatment to the worst casualty in the order of:
 - 1 stopped breathing/heart; and
 - 2 unconscious.

IF THE CASUALTY IS IN AN ENCLOSED SPACE:

- **DO NOT ENTER** the enclosed space unless you are a trained member of a rescue team acting upon instruction.
- Send for help and inform the master.

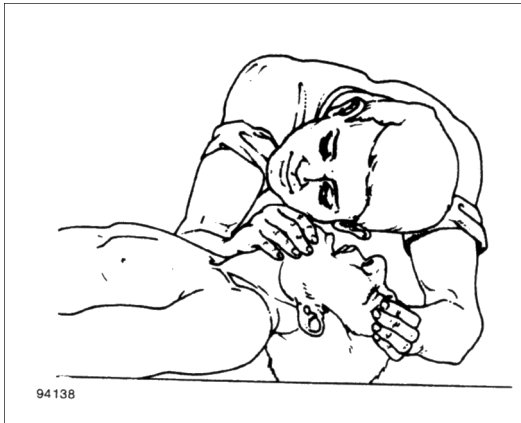
It **MUST** be assumed that the atmosphere in the space is hostile. The rescue team **MUST NOT** enter unless wearing breathing apparatus, which must also be fitted on the casualty as soon as possible. The casualty must be removed quickly to the nearest safe adjacent area outside the enclosed space unless his injuries and the likely time of evacuation makes some treatment *essential* before movement.

5.3 Unconscious casualty

5.3.1 ASSESSMENT OF BREATHING AND HEART FUNCTION

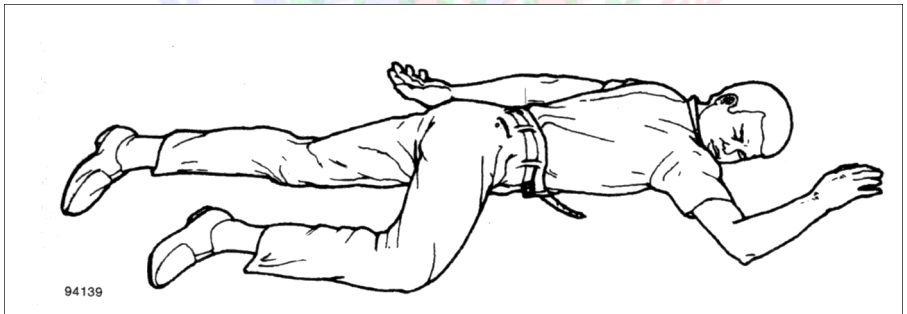
Assessment of breathing

Tilt the head firmly backwards as far as it will go to relieve obstructed breathing. Remove dentures if worn. Clear out any vomit in the mouth if present. Listen and feel for any movement of air, because the chest and abdomen may move, in the presence of an obstructed airway, without moving air. The rescuer's face should



be placed close to the casualty's nose and mouth so that any exhaled air may be felt against the cheek. Also the rise and fall of the chest can be observed and the exhaled breath heard.

If breathing, place casualty in the unconscious position.



Turn casualty face down, head to one side or other as pictured; no pillows should be used under the head. Now pull up the leg and the arm on the side to which the head is facing. Then pull up the chin. Stretch the other arm out as pictured.

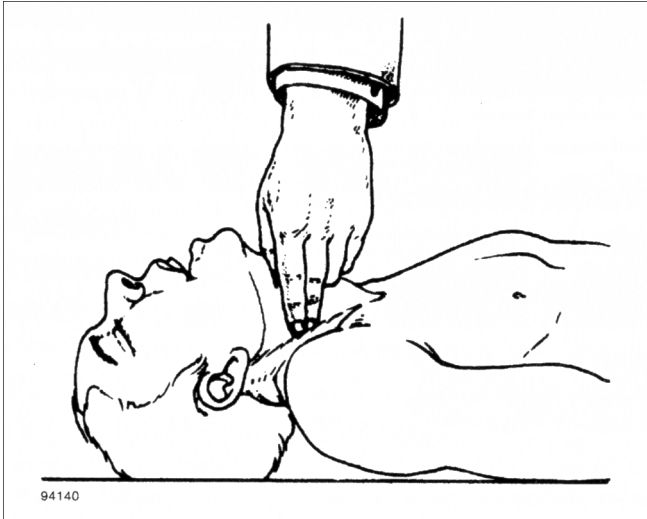
The subsequent treatment of an unconscious person is described in [6.3.1](#).

Assessment of heart function

Feel pulse at wrist and neck.

Quickly check the carotid (neck) pulse by placing the tips of the two fingers of one hand into the groove between the windpipe and the large muscle at the side of the neck.

The carotid pulse normally is a strong one; if it cannot be felt or is feeble, there is insufficient circulation.

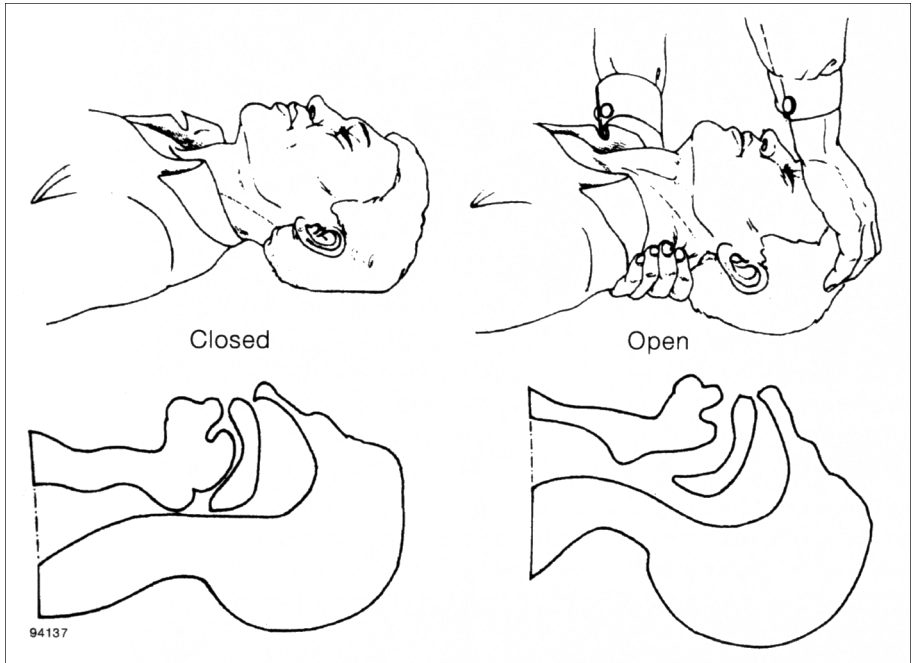


5. 3. 2 NOT BREATHING BUT HEART HAS NOT STOPPED

Airway

Establishing an **OPEN AIRWAY IS THE MOST IMPORTANT STEP IN ARTIFICIAL RESPIRATION**. Spontaneous breathing may occur as a result of this simple measure. Place the patient in a face-up position on a hard surface. Put one hand beneath the patient's neck and the other hand on the forehead. Lift the neck with the one hand, and apply pressure to the forehead with the other to tilt the head backward. This extends the neck and moves the base of the tongue away from

the back of the throat. *The head should be maintained in this position during the entire artificial respiration and heart compression procedure.* If only one rescuer is available the head should be fixed in the shown position by means of a rolled blanket or similar object pushed under the patient's shoulders. If the airway is still obstructed any foreign material in the mouth or throat should be removed immediately with the fingers.

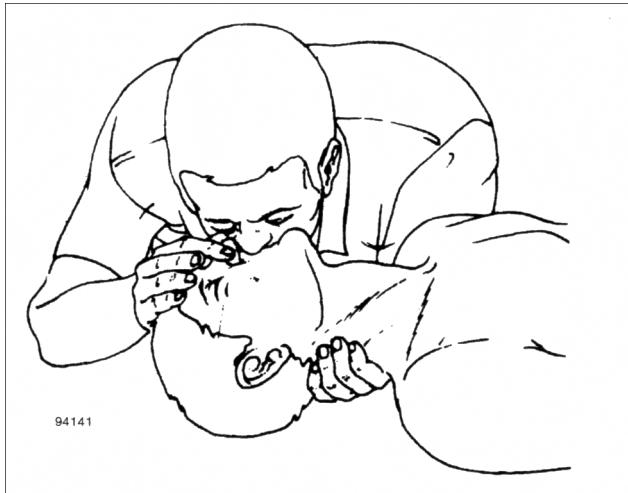


Breathing

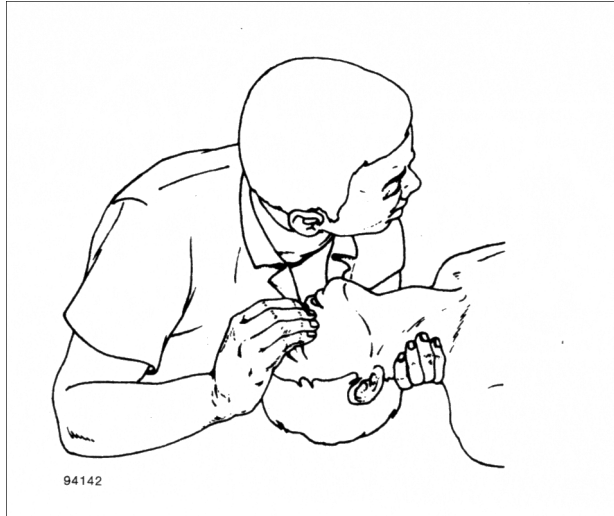
If the patient does not resume adequate, spontaneous breathing promptly after his head has been tilted backward; the mouth-to-mouth or mouth-to-nose method or other techniques should give artificial respiration. Regardless of the method used, preservation of an open airway is essential.

Mouth-to-mouth respiration

- Keep the patient's head at a maximum backward tilt with *one hand* under the neck.
- Place the heel of *the other hand* on the forehead, with the thumb and index finger towards the nose. Pinch together the patient's nostrils with the thumb and index finger to prevent air from escaping. Continue to exert pressure on the forehead with the palm of the hand to maintain the backward tilt of the head.
- Take a deep breath, then form a tight seal with your mouth over and around the patient's mouth.



- Blow four quick, full breaths in first without allowing the lungs to deflate fully. Then continue the procedure.
- Watch the patient's chest while inflating the lungs. If adequate respiration is taking place, the chest should rise and fall.
- Remove your mouth and allow the patient to exhale passively. If in the right position, the patient's exhalation will be felt on your cheek.

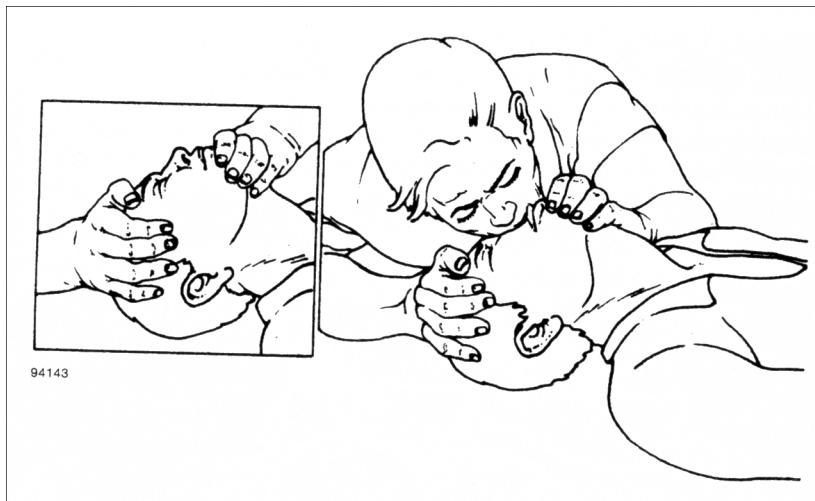


- Take another deep breath, form a tight seal around the patient's mouth and blow into the mouth again. Repeat this procedure 10 to 12 times a minute, once every 5 seconds, for adults and children over 4 years.
- If there is no air exchange, and an airway obstruction exists, reach into the patient's mouth and throat to remove any foreign matter with your fingers and resume artificial respiration. A foreign body should be suspected if you are unable to inflate the lungs, despite proper positioning and a tight air-seal around the mouth or nose.

Mouth-to-nose respiration

The mouth-to-nose technique should be used when it is impossible to open the patient's mouth, when the mouth is severely injured, or a tight seal around the lips cannot be obtained

- Keep the patient's head tilted back with one hand. Use the other hand to lift up the patient's lower jaw to seal the lips.
- Take a deep breath, seal your lips around the patient's nose, and blow in forcefully and smoothly until the patient's chest rises. Repeat quickly 4 times.



- Remove your mouth and allow the patient to exhale passively.
- Repeat the cycle 10 to 12 times per minute.

Alternative method of artificial respiration (Silvester method)

In some instances, mouth-to-mouth respiration cannot be used. For instance, certain toxic and caustic materials present a hazard to the rescuer. The mouth-to-mouth method should be avoided if the casualty has corrosive burns around his mouth or if he has ingested or inhaled any toxic substance, but especially one of the following:

Cyanide (Tables 215 and 645).

Hydrogen sulphide (Table 640).

Hydrocarbons (Table 310).

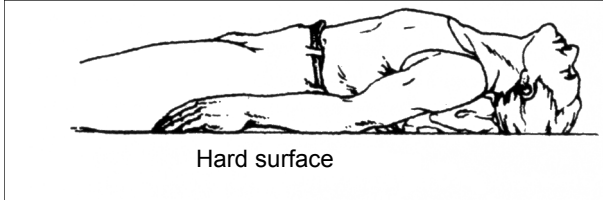
Petroleum and petroleum products (Table 311).

Chlorinated hydrocarbons (Table 340).

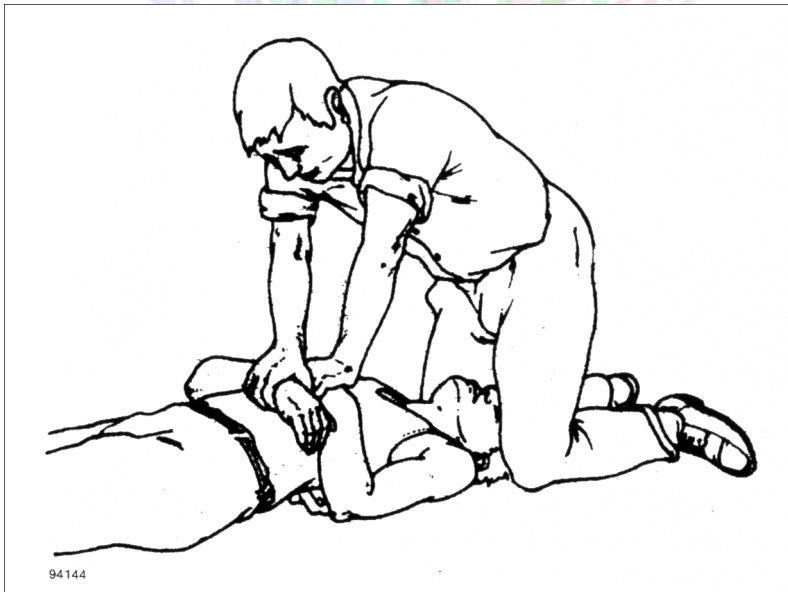
This section describes an effective alternative method of artificial respiration, the Silvester technique. However, this method is much less effective than those previously described, and it should only be used when "mouth-to-mouth" technique cannot be used.

- Lay the patient on his back on a firm surface. Raise his shoulders on a cushion, folded jacket or in some other way.

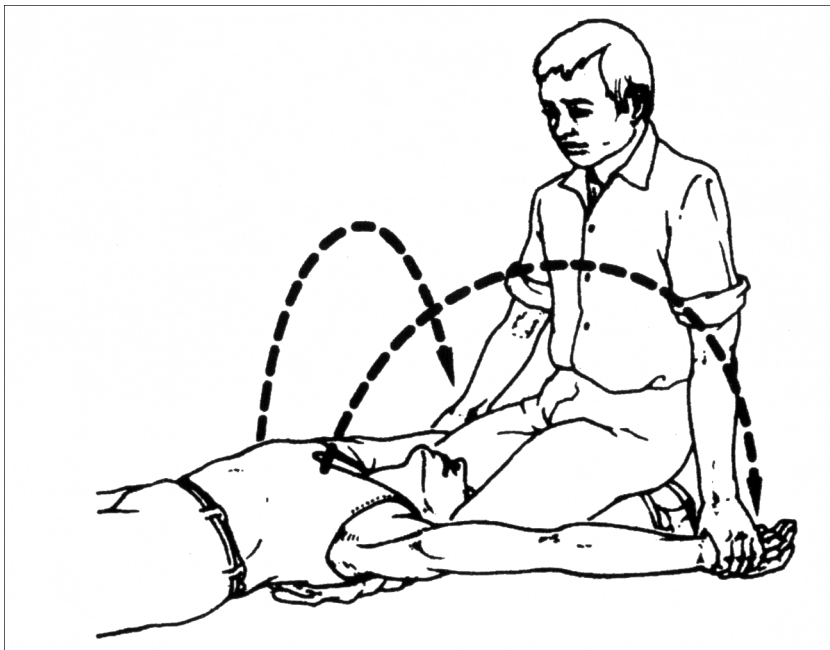
Head fully back. Shoulders raised on clothing etc.



- Kneel astride the patient's head. If necessary, turn his head to one side to clear out the mouth. Grasp his wrists, cross them over the lower part of his chest.



- Rock your body forward and press down on the patient's chest. Release the pressure and, with a sweeping movement, draw the patient's arms backwards and outwards as far as possible. Repeat this procedure rhythmically (12 times per minute). Keep the mouth clear.



Artificial respiration should be continued for 2 hours if necessary; longer if there are signs of life.

5. 3. 3 NOT BREATHING AND HEART STOPPED

Heart compression (external cardiac compression) should be applied together with artificial respiration throughout any attempt to resuscitate a patient whose breathing and heart have stopped. Unless circulation is restored the brain will be without oxygen and the person will suffer cerebral damage within 4 to 6 minutes, and may die.

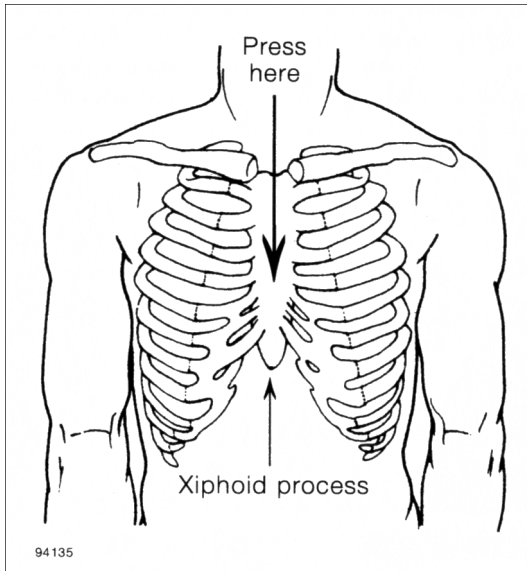
Artificial respiration will bring oxygen-containing air to the lungs of the victim. From there, oxygen is transported with circulating blood to the brain and to other organs, and the effective heart compression will - for some time - artificially restore the blood circulation, until the heart starts beating.

Technique for heart compression

Compression of the sternum produces some artificial ventilation, but not enough for adequate oxygenation of the blood. For this reason, artificial respiration is always required whenever heart compression is used.

Effective heart compression requires sufficient pressure to depress the patient's lower sternum about 4 to 5 cm (in an adult). *For heart compression to be effective, the patient must be on a firm surface. If he is in bed, a board or improvised support should be placed under his back. However, chest compression must not be delayed to look for a firmer support.*

Kneel close to the side of the patient and place only the heel of one hand over the lower half of the sternum. Avoid placing the hand over the tip of the breastbone (xiphoid process) which extends down over the upper abdomen. Pressure on the xiphoid process may tear the liver and lead to severe internal bleeding.

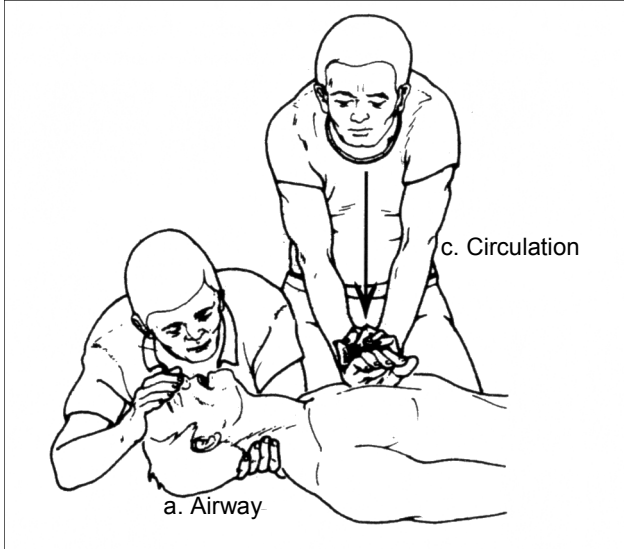


Feel the tip of the sternum and place the heel of the hand about 4 cm towards the head of the patient. Your fingers must never rest on the patient's ribs during compression. This increases the possibility of rib fractures.

- Place the heel of the other hand on top of the first one.

- Rock forward so that your shoulders are almost directly above the patient's chest.
- Keep your arms straight and exert adequate pressure almost directly downward to depress an adult's lower sternum 4 to 5 cm.

Depress the sternum 60 times per minute for an adult (when two rescuers are used). This is usually rapid enough to maintain blood flow, and slow enough to allow the heart to fill with blood. The compression should be regular, smooth, and uninterrupted, with compression and relaxation being of equal duration. **Under no circumstances should compression be interrupted for more than 5 seconds.**



Two-rescuer heart compressions and artificial respiration:

Five heart compressions:

- at a rate of 60 per minute
- no pause for ventilation.

One respiration:

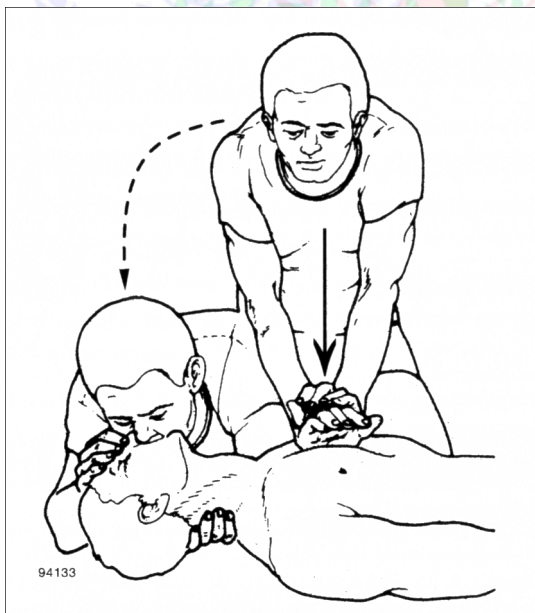
- after each 5 compressions
- interposed between compressions.

Two rescuers preferred

It is preferable to have two rescuers because artificial circulation must be combined with artificial respiration. The most effective artificial respiration and heart compression are achieved by giving one lung inflation quickly after each five-heart compressions (5 : 1 ratio). *The compression rate should be 60 per minute for two rescuers.* One rescuer performs heart compression while the other remains at the patient's head, keeps it tilted back, and continues rescue breathing (artificial respiration). Supplying the breaths without any pauses in heart compression is important, because every interruption in this compression results in a drop of blood flow and blood pressure to zero.

Single rescuer

A single rescuer must perform both artificial respiration and artificial circulation using a 15: 2 ratio. The head should be kept in the shown position by means of a rolled blanket or similar object pushed under the patient's shoulders. *Two very quick lung inflations should be delivered after each 15-chest compression, without waiting for full exhalation of the patient's breath. A rate equivalent to 80 chest compressions per minute must be maintained by a single rescuer in*



order to achieve 50 to 60 actual compressions per minute because of the interruptions for the lung inflations.

One-rescuer cardiopulmonary resuscitation (CPR):

- Fifteen heart compressions at a rate of 80 per minute.
- Two very quick lung inflations.

Checking effectiveness of heart compression: pupils and pulse

Check the reaction of the pupils: a pupil that narrows when exposed to light indicates that the brain is receiving adequate oxygen and blood. If the pupils remain widely dilated and do not react to light, serious brain damage is likely to occur soon or has occurred already. Dilated but reactive pupils are a less serious sign.

The carotid (neck) pulse should be felt after the first minute of the heart compression and artificial respiration, and every 5 minutes thereafter. The pulse will indicate the effectiveness of the heart compression or the return of a spontaneous effective heartbeat (see 5.3.1).

Other indicators of this effectiveness are the following:

- Expansion of the chest each time the operator blows air into the lungs.
- A pulse which can be felt each time the chest is compressed.
- Return of colour to the skin.
- A spontaneous gasp for breath.
- Return of a spontaneous heartbeat.

Terminating heart compression

Deep unconsciousness, the absence of spontaneous respiration, and fixed, dilated pupils for 15 to 30 minutes indicate cerebral death of the patient, and further efforts to restore circulation and breathing are usually futile.

In the absence of a physician, artificial respiration and heart compression should be continued until:

- The heart of the patient starts beating again and breathing is restored.
- The patient is transferred to the care of the doctor, or other health personnel responsible for emergency care.
- The rescuer is unable to continue because of fatigue.

5. 3. 4 SUMMARY OF POINTS TO BE REMEMBERED WHEN APPLYING ARTIFICIAL RESPIRATION AND HEART COMPRESSION

Don't delay. Place patient on his back on a hard surface.

**Step 1
Airway** If patient is unconscious, open the airway; thereafter make sure it stays open.

- Lift up neck.
- Push forehead back.
- Clear out mouth with fingers.

**Step 2
Breathing** If patient is not breathing, begin artificial respiration; mouth-to-mouth or mouth-to-nose respiration.

- Before beginning artificial respiration, check carotid pulse in neck. It should be felt again after the first minute of artificial respiration and checked every 5 minutes thereafter.
- Give four quick breaths and continue at a rate of 12 inflations per minute.
- Chest should rise and fall. If it does not, check to make sure the patient's head is tilted as far back as possible. If necessary, use fingers to clear airway.

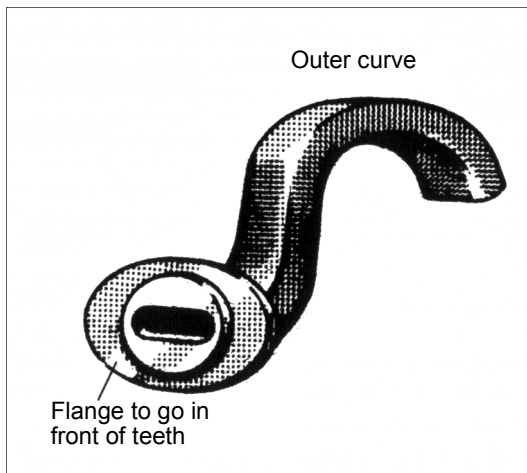
**Step 3
Circulation** If pulse is absent, begin heart compression. If possible, use two rescuers. Don't delay. One rescuer can do the job.

- Locate the pressure point (lower half of sternum).
- Depress sternum 4 to 5 cm (60 to 80 times per minute).
- If one *rescuer* - 15 heart compressions and 2 very quick lung inflations.
- If *two rescuers* - 5 heart compressions and 1 lung inflation.

Pupils or eyes should be checked during heart compression. A pupil that constricts on exposure to light shows that the brain is getting adequate blood and oxygen,

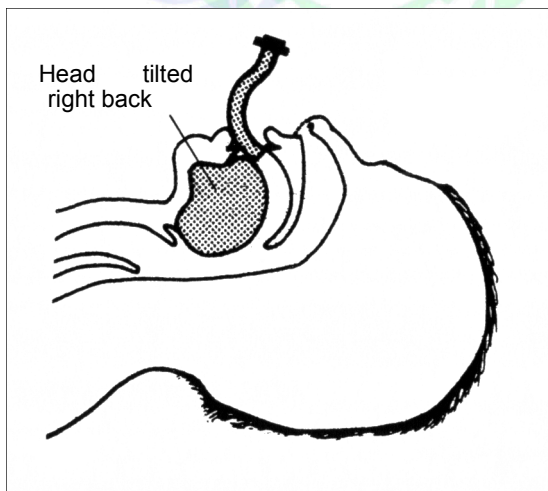
5. 4 INSERTION OF GUEDEL AIRWAY

This airway is for use in an unconscious patient who is breathing on his own, but with great difficulty. The function of the airway is to ensure a clear passage between the lips and the back of the throat.

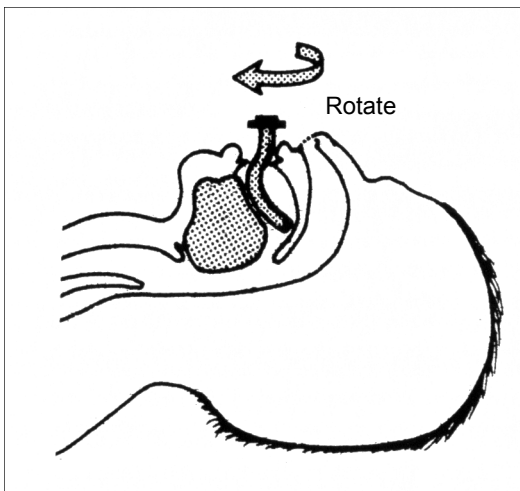


First remove any dentures and suck or swab out any blood or vomit, which is in the mouth in order to clear the air passage. Then, with the head fully back, slide the airway gently into the mouth with the outer curve of the airway towards the tongue. This operation will be easier if the airway is wetted.

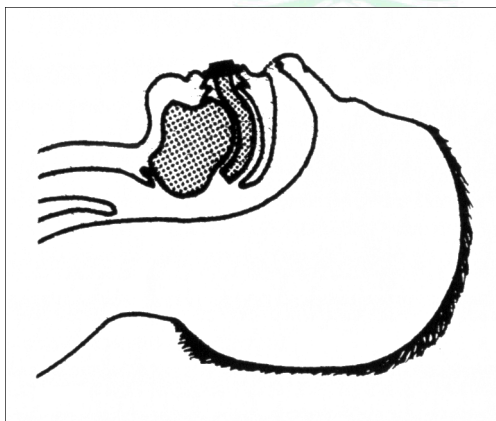
If there is any attempt by the patient to gag, retch or vomit, it is better not to proceed with the insertion of the airway. If necessary, try again later to insert it.



Continue to slide the airway *in* until the flange of the airway reaches the lips. Then rotate the airway through 180° so that the outer curve is towards the roof of the mouth



Bring the jaw upwards and push the airway in until the flange at the end of the airway is outside the teeth (or gums) and inside the lips. If necessary tape one or both lips so that the end of the airway is not covered by them.



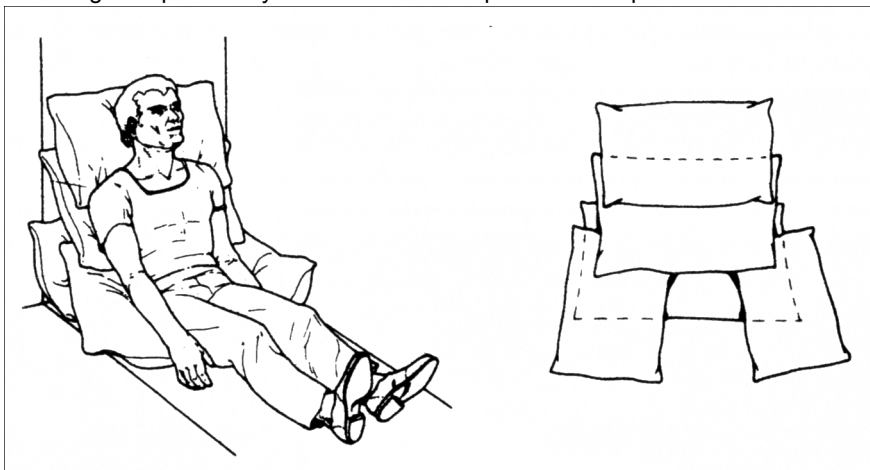
Check now that the patient's breath is coming through the airway. Continue to keep the jaws upward and the head fully back so that the airway will be held in place by the teeth or gums and by its shape.

As the patient regains consciousness, he will spit out the airway.

He should remain in the unconscious position under constant observation until he is *fully* conscious. If he relapses into unconsciousness it may be necessary to reinsert the airway if breathing is still difficult.

5.5 The high sitting-up position

The following position should be used for the casualty who is conscious but having difficulty in breathing, whatever the cause. It is very important that a casualty who shows signs of pulmonary oedema should be placed in this position.



5.6 Morphine administration

Morphine is a very strong pain-relieving drug, which should be used with care. It should be given only where specifically advised in this Guide or on the instruction of a doctor giving advice by radio.

- Give 7.5 mg (half an ampoule) intramuscularly as the first dose.
- If there is no pain relief within 30 minutes, give a further 7.5 mg (half an ampoule) intramuscularly.
- A dose of 7.5 mg (half an ampoule) may be repeated every 4 hours if there is persistent pain.

This drug should be given with caution if there is shortness of breath. It depresses breathing activity if too much is given, or the casualty is sensitive to it. The following signs indicate overtreatment with morphine:

- Shallow and slow breathing.
- Irregular breathing pattern.
- Development of unconsciousness if the casualty was conscious at first.
- Small pinpoint pupils of the eyes.

If these signs are present, **RADIO FOR MEDICAL ADVICE**.

You may be advised by the doctor to give naloxone hydrochloride, which counteracts these side effects of morphine. The usual procedure is:

- Give 0.8 mg naloxone hydrochloride intramuscularly.
- There should be an improvement within 15 minutes if the patient's condition is due to morphine.
- If there is a response, give 0.8 mg naloxone hydrochloride intramuscularly every hour until the casualty recovers from the above signs.

6 THE COMPLICATIONS OF POISONING

6.1 *The respiratory system*

Warning: Morphine must **NOT** be given to any patient who has been gassed, especially by an irritant gas.

6.1.1 ASPHYXIA

Asphyxia (suffocation) causes a lack of oxygen in the blood. It has many causes other than those arising from chemical poisoning. The latter are principally:

- The air passage may be blocked by vomit, blood or secretions.
- Obstruction to breathing in the throat or the air passages through spasm of the air tubes or by swelling of the linings of the voice box due to irritant fumes.
- Fluid in the lung air spaces (pulmonary oedema - see 6.1.2) caused by irritant fumes, e.g. ammonia or chlorine.

- Poisoning of the blood, which prevents the carriage, or use of oxygen in the body caused by, for example, carbon monoxide, cyanides, or aniline.
- Poisoning of the mechanisms of breathing in the chest (e. g. by organo-phosphorus pesticides) or the brain (e. g. by chlorinated hydrocarbons).
- Gases which do not support life because they replace oxygen in the atmosphere, e. g. carbon dioxide, nitrogen, hydrogen.

Diagnosis

- There is difficulty in breathing with an increased rate at first (over 30 per minute). Later it may become slow and stop.
- The pulse is rapid, usually over 100 per minute.
- There is blueness of the skin with purple lips and tongue.
- The patient may be agitated at first but later become apathetic, with muscular weakness. Unconsciousness may follow this.
- The pupils of the eyes will react to light at first. If they become large and do not react to light, life is in danger.

Treatment

- The emergency treatment as described in 8. 3 should be given.
- Continue to give oxygen (see 8. 3. 1) until the patient is breathing without difficulty and has a healthy pink colour.
- Give any special treatment if recommended for that particular chemical in the appropriate table of section 9.

If the patient becomes increasingly breathless, finds difficulty in lying flat, and coughs up a lot of frothy sputum, he may be beginning to suffer from pulmonary oedema (see 6. 1. 2).

6. 1. 2 PULMONARY OEDEMA

Pulmonary oedema is the term used when the lung air spaces become filled with tissue fluid, so that the patient is drowning in his own secretions.

Apart from immediate asphyxia, this is the most serious and dangerous complication of many types of poisoning. It is particularly common after:

- Inhalation of irritant gases or fumes.
- Inhalation of stomach contents whilst the patient is vomiting.

The patient may develop pulmonary oedema at any time up to 48 hours after the initial poisoning.

Diagnosis

The onset may be immediate after exposure to a chemical. However, the patient may recover but then begins to feel unwell again.

The symptoms and signs are likely to be:

- Difficulty in breathing.
- Increase in breathing rates to 30 to 40 per minute.
- Cough with the production of frothy sputum, which is sometimes pink in colour with flecks of blood.
- Difficulty in lying flat.
- Gurgling noise in the throat when the patient is breathing.
- Blue discoloration of the skin.
- Mental agitation and fright.
- Severe sweating

If the pulmonary oedema is severe, the patient may show signs of circulatory collapse (see 6. 2. 1):

- Convulsions may occur (see 6. 3. 2).
- Unconsciousness may follow the onset of pulmonary oedema within a few minutes
- Breathing and the heart may both stop suddenly.

Treatment

If unconscious:

- Place the patient in the unconscious position (see 5. 3).
- Insert a Guedel airway (see 5. 4).
- Give oxygen continuously until the patient recovers (see 8. 3. 1).
- Give furosemide (frusemide) 40 mg intramuscularly at once to increase the amount of urine passed.
- If there is no improvement after 30 minutes, give a further 40 mg furosemide frusemide intramuscularly
- Use a sucker, if available, to help get rid of the frothy secretions.
- If breathing and the heart both stop, give artificial respiration and heart compression (see 5. 3).

If conscious:

- Place the patient in the high sitting-up position (see 5. 5).
- Give oxygen continuously (see 8. 3. 1) until he recovers.
- Give furosemide frusemide 80 mg by mouth at once.
- If there is no improvement after 30 minutes, give a further 40 mg by mouth.
- Give 40 mg by mouth 12 hours later.
- A sucker, if available, may help to get rid of the frothy secretions if the patient cannot cough or spit it out.

RADIO FOR MEDICAL ADVICE IN ALL CASES OF PULMONARY OEDEMA.

This is a serious condition, and every effort should be made to get medical help on board, or transfer the patient to hospital if there is no rapid improvement in the symptoms and signs after treatment or if unconsciousness persists for more than a few minutes.

Patients who have had pulmonary oedema should be kept in bed at rest for a minimum of 48 hours after they appear to be completely recovered, even if the illness has been slight.

If the sputum becomes green or yellow following an attack of pulmonary oedema, the patient may be developing bronchitis or pneumonia. This should be treated as described (see 6. 1. 3 and 6. 1. 4).

6. 1. 3 BRONCHITIS

Bronchitis is an inflammation of the bronchi, which are the branches of the windpipe inside the lungs. There are two forms, acute (i. e. of recent origin) and chronic (i. e. of long standing).

Acute bronchitis

This may be a complication of poisoning occurring:

- Shortly after exposure, particularly following inhalation of fumes, smoke or gases.
- Following an attack of pulmonary oedema (see 6. 1. 2).
- Some hours or even days after exposure.

Diagnosis

The symptoms are:

- Gradual onset of feeling unwell with general aches and pains.
- Slight fever.
- A harsh, dry cough.

- A feeling of rawness in the windpipe in the neck and under the breastbone which is made worse by coughing.

In mild cases there is little fever, but in severe cases the temperature is raised to about 37.8° C to 38.9° C (100° F to 102°F), the pulse rate to about 100, and the respiration rate is usually not more than 24 per minute.

In a day or two the cough becomes looser, phlegm (sputum) is coughed up; at first sticky, white and difficult to bring up, later greenish yellow, thicker and more copious. The temperature begins to return to normal. The patient is usually well in about a week to ten days, but this period may often be shortened if antibiotic treatment is given.

Note:

- The rise in temperature is only moderate.
- The increase in the pulse and respiration rates is not very large.
- There is no sharp pain in the chest.

These symptoms distinguish bronchitis from pneumonia (see 6. 1. 4) which gives rise to much greater increases in temperature and pulse rate with obvious rapid breathing and blue tinge to the lips and sometimes the face. The absence of pain distinguishes bronchitis from pleurisy (see 6. 1. 5) for in pleurisy there is severe sharp pain in the chest, which is increased on breathing deeply or on coughing.

General treatment

The patient should be put to bed and placed in the high sitting-up position (see 5. 5) because the cough will be frequent and painful during the first few days. A container should be provided for the sputum, which should be inspected. Smoking should be discouraged.

Specific treatment

Give soluble aspirin 600 mg every 4 hours by mouth. This is sufficient treatment for milder cases with a temperature of up to 37. 8°C (100°F) which can be expected to return to normal within 2 to 3 days. If the temperature is higher than 37. 8°C (100° F) give ampicillin 500 mg by mouth at once, followed by ampicillin 500 mg every 6 hours by mouth for the next 5 days.

Note: If the patient has a known allergy to any of the penicillin group of drugs, of which ampicillin is one, give 2 co-trimoxazole tablets by mouth every 12 hours for 5 days.

Co-trimoxazole must not be given to a woman who is pregnant or might be pregnant. If pregnancy is suspected, **RADIO FOR MEDICAL ADVICE.**

Should there be no satisfactory response to treatment after 3 days, **RADIO FOR MEDICAL ADVICE**.

Subsequent management

The patient should remain in bed until the temperature has been normal for 48 hours.

Examination by a doctor should be arranged at the next port.

Chronic bronchitis

This is usually found in men past middle age who are aware of the diagnosis. Exposure to dust, fumes and tobacco smoke predisposes to the development of chronic bronchitis. Sufferers usually have a cough of long standing.

Superimposed on his chronic condition, a patient may also have an attack of acute bronchitis, for which treatment (see 6. 1. 3) should be given. If this occurs, the temperature is usually raised and there is a sudden change from clear, sticky or watery sputum to thick yellow sputum. Anyone with chronic bronchitis should seek medical advice on reaching his homeport.

6. 1. 4 PNEUMONIA

Pneumonia is an inflammation of one or more lobes of a lung. The onset may be rapid over a period of a few hours after inhalation or ingestion of a chemical. The onset may be delayed, however, for 2 or 3 days, or it may occur as a complication of bronchitis (see 6. 1. 3) or pulmonary oedema (see 6. 1. 2).

Diagnosis

The patient is seriously ill from the onset with:

- Fever and shivering attacks.
- A dry cough at first followed by production of thick, sticky sputum, which is usually yellow or green and occasionally tinged with blood.
- Difficulty in breathing, which is often rapid and shallow at a rate of 30 per minute.
- Blueness of the skin, ears and lips.
- A rapid pulse rate of over 110 per minute.
- Occasionally pain associated with breathing or coughing. This may be localized to one side of the chest.

The temperature is usually as high as 39. 4°C to 40. 6°C (103°F to 105°F).

General treatment

The patient should be in bed in the high sitting-up position (see 5. 5). Provide a beaker for sputum in order to examine its appearance. Encourage the patient to drink because he will be losing a lot of fluid both from breathing quickly and from sweating.

Specific treatment

- Give oxygen as directed (see 8. 3. 1) if the patient is blue until his condition and colour improve.
- Give ampicillin 500 mg intramuscularly every 6 hours for 2 days, followed by 500 mg every 6 hours by mouth for 3 days, or for longer if advised to do so by **RADIO MEDICAL ADVICE**.

Note: If the patient has a known allergy to any of the penicillin group of drugs, of which ampicillin is one, give 2 co-trimoxazole tablets by mouth every 12 hours for 5 days.

Co-trimoxazole must not be given to a woman who is pregnant or might be pregnant. If pregnancy is suspected, **RADIO FOR MEDICAL ADVICE**.

- Give paracetamol 1000 mg every 6 hours by mouth if there is any pain on breathing. If this is not effective, give 1000 mg every 4 hours.

If the patient shows no sign of improvement after 2 days, **RADIO FOR MEDICAL ADVICE**.

DO NOT GIVE MORPHINE FOR PAIN UNLESS SPECIFICALLY ADVISED TO DO SO BY A DOCTOR

Subsequent management

The patient should be encouraged to breathe deeply as soon as he is able to do so and be told not to smoke. Patients who have had pneumonia should be kept in bed until they are feeling better and their temperature, pulse and respiration are normal. Increasing activity and deep breathing exercises help to get the lungs functioning normally after the illness. Patients who have had pneumonia should not be allowed back on duty until they have seen a doctor.

6. 1. 5 PLEURISY

Pleurisy is an inflammation affecting part of the membrane (the pleura) which covers the lungs and the inner surface of the chest wall. The condition is usually a complication of serious lung diseases such as pneumonia, but may follow inhalation of toxic gases or fumes. In a typical case arising during the course of pneumonia, the breathing movements rub the inflamed pleural surfaces together, causing severe chest pain which is usually felt in the armpit or breast

area. It is described as a stabbing or tearing pain which is made worse by breathing or coughing and relieved by preventing movement of the affected side. Occasionally the hand placed over the site of pain can feel the rubbing.

If pleurisy occurs without the other signs of pneumonia, **RADIO FOR MEDICAL ADVICE**. A doctor at the first opportunity, even if recovered, should see all cases of pleurisy.

Pleural effusion (fluid round the lungs)

In a few cases of pleurisy the inflammation causes fluid to accumulate between the pleural membranes at the base of a lung. This complication should be suspected if the patient remains ill but the chest pain becomes less and chest movement on the affected side is diminished in comparison with the unaffected side.

General treatment

If pneumonia is present, treat as described in 6. 1. 4. Otherwise, confine the patient to bed. If there is difficulty in breathing, put the patient in the high sitting-up position (see 5. 5). **RADIO FOR MEDICAL ADVICE**.

6. 2 The heart and blood system

6. 2. 1 ACUTE CIRCULATORY COLLAPSE

Circulatory collapse is the name given to the condition where there is a gradual onset of unconsciousness due to a poor flow of blood to the brain. This may be caused by either failure of the heart (see 6. 2. 2) or by a direct effect of the chemical on the blood vessels in the rest of the body, preventing an adequate supply of blood reaching the heart and therefore the brain. The symptoms and signs of this condition are described below.

If it is not treated adequately, this may be a progressive and fatal condition. It is important to recognize this condition, since it may initially be confused with fainting attacks (syncope). Syncope is a temporary failure of the blood circulation due to fright, pain or a nervous shock and is seldom serious. The signs and symptoms are very similar to those of a circulatory collapse.

Note: Other causes of circulatory collapse, such as severe injuries and bleeding, should be excluded before a diagnosis of poisoning is made.

Circulatory collapse can also be caused by:

- Severe traumatic injuries.
- Bleeding.
- Loss of body fluid owing to severe burns.

Diagnosis

Circulatory collapse

The patient will have the following signs:

- A pale, waxy colour.
- The skin is cold and clammy to the touch.
- A rapid, weak pulse with a low blood pressures.
- A reduction in the amount of urine passed if this condition persists for more than one or two hours.
- **Gradual onset of unconsciousness may occur.**
- The heart may stop (see 5. 3).

Fainting attacks (syncope)

The patient will have similar signs to the above except that:

- The pulse is usually slow at first and then becomes rapid during recovery.
- The duration of unconsciousness is only a few minutes and the patient recovers rapidly after treatment.

(There will not be any reduction in urine output since a fainting attack only lasts a short while)

Treatment

Circulatory collapse

- Place in the unconscious position (see 5. 3), and insert Guedel airway (see 5. 4).
- Arrange two or three pillows under the patient's legs so that they are higher than the head.
- Keep the patient warm.
- Give oxygen (see 8. 3. 1).
- **RADIO FOR MEDICAL ADVICE.**

Fainting attacks

- Place the patient in the unconscious position (see 5. 3).
- Loosen the patient's clothing around the neck.
- Keep the patient warm. With these measures, the patient will recover completely within a few minutes.

6. 2. 2 HEART FAILURE

Heart failure is the term used to describe the condition when the heart muscle is damaged, either temporarily or permanently and therefore does not pump blood around the body effectively. There are a number of chemicals, which affect the heart directly, but some may cause a lack of oxygen in the body, which results in the same effect. Heart failure may occur within a few hours of chemical poisoning and may be relatively rapid in onset. However, it may also develop gradually over a period of 24 to 48 hours. The patient may recover with treatment, but occasionally the heart failure may be persistent.

It should be remembered that a patient in the older age group might have a poor heart and already be under treatment.

Diagnosis

Heart failure is characterized by:

- A feeling of weakness, apathy and occasionally headache.
- Difficulty in breathing, particularly after exertion. The breathing is usually rapid and shallow.
- Sweating and restlessness with a rapid pulse.
- Blueness of the lips, tongue and ears.
- The veins in the neck may be very prominent in severe cases.
- Oedema, if heart failure has been present for several hours (see below).
- A reduction in the amount of urine passed (see kidney failure, 6. 5. 1).

If the heart failure is severe, or sudden in onset, pulmonary oedema may develop (see 6. 1. 2).

Treatment

- Place in the high sitting-up position (see 5. 5).
- Give oxygen (see 8. 3. 1).
- Give furosemide frusemide 40 mg by mouth, followed by a further 40 mg by mouth 12 hours later if oedema is present.
- Give only small quantities of water to drink. (See diagnosis and treatment of kidney failure in 6. 5. 1).

Oedema is the name given to the presence of an abnormal collection of fluid in the tissue under the skin. Its presence can be confirmed by gently pressing the tip of one finger on to the affected part for 10 seconds. When the finger is taken away

a dent will be seen in the skin. In heart failure, the swelling first appears in the feet and ankles and spreads up the legs. If the patient is in bed, the oedema will collect under the skin overlying the lower part of the spine. The swelling is worse in the evenings or after exertion

RADIO FOR MEDICAL ADVICE.

6.3 *The nervous system*

6.3.1 UNCONSCIOUSNESS

Unconsciousness may vary from a sleep-like state to a deep coma. If the coma is very deep and lasts for a long while, it indicates a severe degree of poisoning.

Remember that there are many other causes for unconsciousness apart from poisons. These include:

- Serious traumatic injury.
- Fits.
- Diabetes.
- A stroke.

The most immediate danger to life is from failure of, or obstruction to, breathing.

Diagnosis

- The patient looks as though he is asleep, but does not awaken when rousing stimuli are applied, e. g. rubbing the knuckles of the clenched fist firmly up and down the breast-bone. If the degree of consciousness is lighter he may, however, stir or groan.
- The muscles feel flabby, but are sometimes tense.
- The pulse may be either rapid or slow, but in serious cases will be weak or irregular.
- The breathing may be normal, but is often slow and shallow. Check for signs of asphyxia (see 6.1.1).
- The pupils are often small, but if they are very large, and do not become smaller when a light is shone on them, this is a sign of deep coma.
- The body temperature may become low (hypothermia) if the patient has been unconscious for some hours.

Treatment

- Place in the unconscious position (see 5. 3).
- Any blood, vomit or other secretions from the mouth must be mopped out, or removed by the use of a sucker if available.
- Insert a Guedel airway (see 5. 4).
- Watch for any signs of difficulty in breathing which may be due to:
 - Asphyxia (see 6. 1. 1).
 - Pulmonary oedema (see 6. 1. 2).
 - Bronchitis and pneumonia (see 6. 1. 3 and 6. 1. 4).
 - Heart failure (see 6. 2. 2).

These should be treated in the appropriate way as described according to the diagnosis.

- If the patient is unconscious for longer than a few hours, further general measures may be necessary (see below).
- **DO NOT GIVE ALCOHOL OR INJECT MORPHINE OR ANY STIMULANT.**

General management

All unconscious patients:

- Must have a clear air passage.
- Must be kept in the unconscious position.
- Must never be left alone.

Keeping the air passage clear is essential, and requires the patient to be kept in the unconscious position. Unconscious patients must never be left unwatched in case they move, vomit, have a fit or fall out of their bunk. They must be turned from one side to the other at least every 3 hours to prevent bedsores. Turn the patient gently and roll him smoothly from one side to the other. **The head must always be kept back with a chin-up position when actually turning, and at no time must the head be allowed to bend forwards with the chin sagging.** This is both to help to keep a clear air passage and to prevent neck injuries.

Check the breathing and that the Guedel airway is securely in place as soon as you have turned the person.

Make sure that all limb joints are neither fully straight nor fully bent. Ideally they should all be kept in mid-position. Place pillows under and between the bent knees and between the feet and ankles. Use a bed-cage (a large stiff cardboard box will make a good improvised cage) to keep the bedclothes from pressing on the feet and ankles. Check that elbows, wrists and fingers are in a relaxed midposition

after turning. Do not pull, strain or stretch any joint at any time. Make quite sure that the eyelids are closed and that they remain closed at all times, otherwise preventable damage to the eyeball can easily occur. Irrigate the eyes every 2 hours by opening the lids slightly and pouring some saline solution gently into the corner of each eye in such a way that the saline will run across each eye and drain from the other corner. A saline solution can be made by dissolving one level teaspoonful of salt in half a litre (one pint) of boiled water, which has been allowed to cool

After 12 hours of unconsciousness further problems will arise. Unconscious people must be given nothing by mouth in case it chokes them and they suffer from obstructed breathing. However, after 12 hours of unconsciousness fluid will have to be given, particularly in hot climates and/or if the patient is obviously sweating. Because fluids cannot be given by mouth the fluid should be given *per rectum* (see 6. 5. 3). An input-output chart will be necessary and the instructions given under fluid balance in 6. 5. 3 should be followed. A container connected by tubing to a condom over the penis should be used to collect the urine. The mouth, cheeks, tongue and teeth should be moistened every 3 to 4 hours, using a small swab moistened with water. Carry out mouth care every time the person is turned.

After 48 hours or unconsciousness move The limb joints at least once a day. All the joints in all the limbs should be moved very gently in such a way as to put each joint through a *full range* of movement, provided that other considerations such as fracture do not prevent this. Watch that the exercise of the arms does not interfere unduly with the patient's breathing. Do the job systematically. Begin on the side of the patient, which is most accessible. Start with the fingers and thumb, then move the wrist, the elbow and the shoulder. Now move the toes, the foot and the ankle. Then bend the knee and move the hip round. Next, turn the patient, if necessary with the help of another person, and move the joints on the other side.

Remember that unconscious patients may be very relaxed and floppy - so do not let go of their limbs until you have placed the limbs safely back on the bed. Hold the limbs firmly but not tightly and do everything slowly and with the utmost gentleness. Take your time in moving each joint fully before going on to the next.

6. 3. 2 CONVULSIONS

Convulsions are involuntary contractions of the muscles, which are usually accompanied by unconsciousness. They usually occur when there is severe irritation of the brain. There is a variation in severity from twitching of the muscles to general heaving of the body or (most *severe*) a maintained general spasm of all muscles. The latter condition endangers life by restricting the breathing. There are a number of causes, but the most important are:

- The patient is an epileptic.

- Poisoning by chemicals or drugs.
- Lack of oxygen.

Convulsions may occur at any time after poisoning and recur several times. The more frequent and longer the attacks, the greater the danger to life.

Treatment

- Place the patient in the unconscious position (see 5. 3).
- Ensure that there are no hard or sharp objects in the vicinity so that the patient will not injure himself.
- Give Diazepam 10 mg intramuscularly.
- If this does not control the fit within 10 to 15 minutes, give a further injection of Diazepam 5 mg intramuscularly.
- **RADIO FOR MEDICAL ADVICE.**

For a few chemical poisons, there are specific treatments for the fits they cause. These will be given in the appropriate tables of section 9.

General management

Prevent the patient from hurting himself in the convulsive stage. Never restrain him forcibly, as this may cause injury, but remove hard objects and surround him with pillows, clothing or other soft material. As opportunity arises, put the handle of a spoon, or other hard object, wrapped in a handkerchief or piece of cloth, between his teeth at the side of the mouth to prevent the tongue being bitten. After the fit is over, let him sleep it off as he may be rather confused and dazed when he comes round. Reassure him, and do not leave him until you are sure he is aware of his surroundings, and knows what he is doing.

6. 3. 3 MENTAL CONFUSION STATE

Mental Confusion State is the name given to the condition where a patient becomes confused and disoriented after being poisoned by a chemical. This can occur either as a direct result of the chemical on the brain, e. g. chlorinated hydrocarbons, or because of asphyxia (see 6. 1. 1), circulatory collapse (see 6. 2. 1), heart failure (see 6. 2. 2), liver failure (see 6. 4. 5) or kidney failure (see 6. 5. 1).

Diagnosis

If the mental Confusion State is due to a direct action of the chemical on the brain, the patient will develop the signs and symptoms within 15 to 30 minutes after exposure. The patient may be disorientated as to the date, time and place, and be

unable to speak coherently. He may be unable to recognize friends or to perform simple tasks, which he does in everyday life. On occasions, the patient may appear drowsy and can only be roused with difficulty. In severe cases, he may become unconscious (see 6. 3. 1). Some chemicals may cause confusion with mental agitation and aggressive violent behaviour.

Treatment

- All patients should be placed in the ship's hospital or in a quiet cabin in order to rest quietly.
- The patient should be kept under observation and at rest for at least 24 hours after apparent recovery.
- Look for signs of asphyxia (see 6. 1. 1), circulatory collapse (see 6. 2. 1), heart failure (see 6. 2. 2), liver failure (see 6. 4. 5), kidney failure (see 6. 5. 1) and treat for these if appropriate.
- If severe mental agitation with aggressive behavior occurs, give chlorpromazine 25 mg intramuscularly. If there has been no improvement after 30 minutes, give a further 50 mg intramuscularly.
- **RADIO FOR MEDICAL ADVICE.**

6. 4 The digestive system

6. 4. 1 STOMACH AND INTESTINES

Chemicals may act as local irritants on the stomach and intestines. They may also be absorbed, and cause general poisoning symptoms (see 4. 1. 2). The more severe corrosive chemicals, e. g. acids and alkalis, may cause bleeding or perforation of the gut. Remember that other illnesses, e. g. food poisoning, peptic ulcer alcohol excess, may cause similar symptoms.

Diagnosis

- There may be chemical burns around the lips and the mouth and throat.
- Nausea and vomiting usually occur, but there may be symptoms of more general poisoning.
- Diarrhoea may occur; it is important to note whether the faeces become black after poisoning since this is likely to be caused by bleeding from the gut.
- Thirst may become intense after severe diarrhoea and vomiting.

Treatment

Emergency first aid as described in [section 8](#) should be given first.

Pain

There may be pain in the mouth, throat or abdomen, particularly with corrosive chemicals.

Treatment of pain

- Give two magnesium trisilicate tablets. Repeat every 2 hours until relief is obtained.
- For very severe pain give morphine sulphate 7.5 mg intramuscularly as directed in 5.6.

6.4.2 VOMITING

- This may relieve the patient if the irritant has thereby been cleared.
- However, frequent and prolonged vomiting is a bad sign. If the vomited matter is green with bile, this may suggest a paralysis of the gut.
- RADIO FOR MEDICAL ADVICE.
- THE PATIENT SHOULD BE TRANSFERRED TO A HOSPITAL AS SOON AS POSSIBLE.

Treatment of persistent vomiting

- Give frequent glasses of water only - at least one every hour - for 36 hours or until the patient has recovered.
- DO NOT GIVE SOLID FOOD.
- Give an injection of metoclopramide hydrochloride 10 mg intramuscularly every 6 hours until vomiting has stopped.
- The maximum amount to be given over a 24-hour period should not be more than 30 mg.

6.4.3 BLEEDING

- The patient may vomit up bright red blood, or dark brown "coffee grounds" which is blood that has been altered in the stomach.
- He may also pass black, tarry, foul-smelling faeces which may be solid or fluid.
- If severe bleeding occurs, there will be signs of circulatory collapse (see 6.2.1).

Treatment of bleeding

- Patients who have internal bleeding may need a blood transfusion.
- RADIO FOR MEDICAL ADVICE.

6. 4. 4 PERFORATION OF THE GUT

If an intense pain develops in the stomach accompanied by a rigid abdomen when touched, then a perforation of the gut may have occurred. This causes peritonitis, which is an inflammation of the thin layer of tissue (the peritoneum) which covers the intestines and lines the inside of the abdomen. The onset of peritonitis may be assumed when there is a general worsening of the condition of a patient already seriously ill following ingestion of corrosive chemicals. It commences with severe pain all over the abdomen - pain which is made worse by the slightest movement. The abdomen becomes hard and extremely tender, and the patient draws up his knees to relax the abdominal muscles. Vomiting occurs and becomes progressively more frequent, large quantities of brown fluid being brought up without any effort. The temperature is raised (up to 39.4°C (103°F)) and the pulse is feeble and rapid (110 to 120), gradually increasing in rate. The pallid anxious face, the sunken eyes and extreme general weakness all confirm the gravely ill state of the patient. If hiccoughs begin, this must be regarded as a very serious sign.

Treatment of perforation of the gut

- Give nothing by mouth.
- Give only one dose of morphine as directed in 5. 6.
- **RADIO FOR MEDICAL ADVICE.**
- **TRANSFER THE PATIENT TO A HOSPITAL AS SOON AS POSSIBLE.**

6. 4. 5 THE LIVER

The liver is the chemical factory where the body attempts to destroy all poisons. It is almost always affected in poisoning, but may also be severely damaged by certain chemicals, e. g. chlorinated hydrocarbons, metal salts and phosphorus. Injury to the liver does not show itself until two to three days after poisoning.

Diagnosis

- There is often nausea with vomiting with a fever.
- The whites of the eyes may become yellow, followed by the skin generally (jaundice); this is often the first sign of liver damage.
- There may be pain and tenderness in the right upper abdomen.
- The urine often becomes dark brown.
- The tongue is dirty, and the faeces may become copious, foul and pale like putty.

Rapid and progressive failure of the liver causes increasing drowsiness followed by loss of consciousness and death after some days.

Treatment

- The patient should rest in bed and be kept warm.
- Although the patient may be feeling very sick he should be encouraged to take a high-carbohydrate diet in the form of liquids and bread. Liquids should include at least 2 teaspoonfuls of glucose in a glass of water every 2 hours. In addition he may be given plenty of bread, soft drinks and sweet tea. Food with a high protein content (red meats, fish, chicken, eggs, and milk) should be avoided.
- No drugs should be given unless there is severe vomiting, in which case give metoclopramide hydrochloride 10 mg intramuscularly every 6 hours; continue until vomiting has stopped; the maximum amount to be given over a 24-hour period should not be more than 30 mg.
- **RADIO FOR MEDICAL ADVICE.**

The illness is likely to take some days to resolve and normally a long period of convalescence is advised, during which no alcohol should be taken. If there is a rapid onset of the symptoms and signs, associated with drowsiness or coma, then the damage is likely to be severe.

- **THE PATIENT SHOULD BE TRANSFERRED TO HOSPITAL AS SOON AS POSSIBLE.**

6. 5 The urinary system

6. 5. 1 THE KIDNEYS

Most chemicals are excreted by the kidneys, which may be damaged in the process. In severe poisoning, kidney failure may develop after 24 hours, and if it does not improve, the patient may die after 7 to 14 days. Important points to be aware of are the following:

- A steady reduction of urine production may be a warning of the onset of kidney damage.
- Kidney failure must not be confused with retention of urine in the bladder.
- Kidney failure may arise for reasons other than chemical poisoning.

Diagnosis

The volume of urine passed, if any, should be measured and recorded every 2 hours. There will be only a small amount of urine passed in a period of 24 hours, usually less than 500 ml. If no urine is passed at all, or less than 180 ml is passed in 6 hours, check whether the bladder is overfull (retention) (see 6. 5. 2). If it is not full then kidney failure is present.

Symptoms, which may be associated with kidney failure, are:

- Vomiting and diarrhoea.
- Persistent hiccoughing.
- A distended abdomen.

The chemical, causing a persistent desire to pass urine may irritate the bladder. It may be painful to pass urine and there may be staining with blood.

If kidney failure has been diagnosed, **RADIO FOR MEDICAL ADVICE**.

Treatment

It is important in all types of chemical poisoning, where kidney failure may occur, to promote a good urine output, preferably more than 2 litres in 24 hours. The patient should therefore be given at least 2^{1/2} litres of non-alcoholic drinks or water within every 24 hours, unless there is a reduction in the amount of urine produced. The following indicates the amount of fluid to be given for the appropriate amount of urine produced.

- Less than 180 ml of urine produced over a 6-hour period - apply fluid restrictions as set out below. This indicates true kidney failure.
- Between 180 and 500 ml of urine produced over a 6-hour period - give the patient a quantity of sweet drinks or water equal to the amount of urine passed plus 200 ml of water during the following 6 hours. This should be continued until the urine output increases to over 500 ml in 6 hours, or medical advice has been obtained to the contrary.
- More than 500 ml of urine produced over a 6-hour period; give at least 650 ml non-alcoholic sweet drinks or water within every 6 hours.

Note: Any substantial increase in fluids taken by mouth which does not result in the production of a similar volume of urine in the following 6 to 12 hours is dangerous and the above criteria must be applied.

Fluid restriction

Allow the patient to drink a quantity of water equal to the total urine passed the previous day, plus 750 ml over the next 24 hours. If the cabin temperature is greater than 25 C, give an additional 250 ml of water. It is important to look for any signs of waterlogging (oedema) in the body, which may indicate heart failure (see 6. 2. 2).

6. 5. 2 THE BLADDER

It is common in cases of prolonged unconsciousness for the urinary bladder to become overfull (urinary retention). It is also possible for this to occur in a

conscious patient. It is an important cause of not passing urine, and should be distinguished from kidney failure. If retention is present the bladder becomes increasingly distended, with the patient complaining of pain if he is conscious. The bladder can be felt in the lower abdomen as a rounded, tender swelling above the pubic bone and, in severe cases, can extend upward as far as the navel.

6. 5. 3 FLUID BALANCE

The body has self-regulating mechanisms to maintain a normal balance between fluid intake and fluid loss.

Fluid intake

An average daily intake of fluids from food and drink is about 2.5 litres. In temperate climates it is possible to manage for a short time on as little as 1 litre (just under 2 pints). In hot climates, where there is a large fluid loss through sweating, an intake of 6 litres per day may be necessary.

Fluid loss

Body fluid is lost through unseen perspiration, obvious sweating, the breath, the urine and the faeces. At least 2.5 litres of fluid will be lost in this way during the day, which may be increased in hot climates.

In any illness where fluid balance is likely to be a problem, a fluid chart recording the amount of fluid intake and fluid loss should be started. During the first 12-hour period the fluid intake should normally be 0.5 to 0.75 litres *more* than the fluid loss. After the first 12-hour period the fluid intake and loss should balance over the day, taking into account loss due to sweating, etc. as mentioned above.

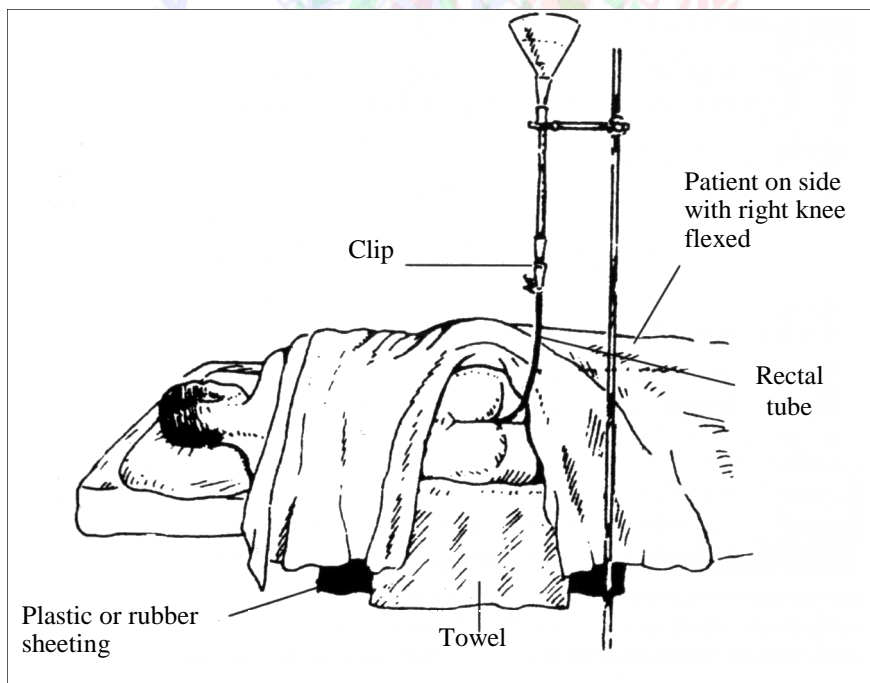
If the patient cannot take fluid by mouth for any reason, such as unconsciousness, persistent vomiting or burns to the mouth and throat, it may become necessary to give fluid by rectum to maintain fluid balance.

Giving fluid by rectum

To prepare the bed, place two pillows, one on top of the other, across the middle of the undersheet. Protect the pillows with a width of rubber or plastic sheeting covered by a wide clean towel. Allow the ends of the sheeting and towel to hang over the side of the bed to drain any possible leakage. The patient should be placed lying on his left side with his buttocks raised on the pillows and with his right knee flexed. He should be made comfortable but only one pillow should be allowed to support his head so that the tilt can be maintained. A sheet should then cover him, leaving only the buttocks exposed.

The importance of the treatment should have been explained to the patient and he should be encouraged to relax and not to resist. The buttocks should be separated gently, then a catheter (26 French gauge) well lubricated with petroleum jelly (vaseline) should be passed, slowly and gently, through the anus into the rectum for a distance of about 23 cm (9 inches). After the catheter has been inserted, its external end should be taped to the skin in a convenient position to attach to a tube and drip set. Give 180 ml (6 fl oz) of water slowly through the tube taking about 10 to 15 minutes to drip the water in. This amount will usually be retained. Leave the catheter in position and block its end with a spigot, or small cork, or compression clip

Give the patient a further 180 ml of water every 4 hours. This should give a fluid intake of about 1000 ml (1 litre) per day. It is worth trying to increase the amount given on each occasion to 200 ml and to give this every 3 to 3 1/2 hours, particularly if the weather is warm and the patient is sweating. However, if any overflow occurs the amount given must be reduced. The rectum will not retain large amounts of fluid and fluid must be retained in order to be absorbed. Occasionally the rectum will not accept fluid readily, especially if it is loaded with faeces. Smaller quantities at more frequent intervals should be tried in these cases.



Careful observation will show whether the fluid is being retained. Aim to give at least 1 litre of fluid per day if possible. Giving fluid by rectum should be continued until the patient can safely take fluid by mouth, or medical assistance becomes available.

6.6 High temperature

A temperature of over 40°C (104°F) can be dangerous to the survival of the individual and requires careful management and nursing.

Treatment

- Give soluble aspirin 600 mg every 4 hours by mouth.
- Place a sponge wrung out in tepid or cold water in each armpit and another on the forehead. With the patient naked sponge him all over, using long strokes, with tepid or cold water.
- In addition, ice packs or cold wet compresses may be applied to the forehead, armpits and groin, and iced drinks given.
- The air-conditioning controls should be altered and a fan should be used to increase air movement and evaporation from the skin.
- Check the patient's temperature frequently as you cool him. Because this treatment causes rapid cooling of only parts of the body, it is important that the thermometer remains in position under the tongue for 4 minutes so that the temperature recorded is that of the body as a whole. There should not be any ice in the mouth while the temperature is being recorded.
- After tepid sponging, when the patient's temperature is down to at least 39°C (102°F), the skin may be dried and powdered with talc.
- If the patient complains of cold and starts to shiver and his temperature has fallen sufficiently, cover him with a thin sheet.
- As the temperature may well rise again, check the temperature every 30 minutes until it has been below 39°C for at least an hour; thereafter check the temperature hourly until it has returned to normal (37°C) (98.6°F).

If the brain centre, which controls body temperature, is damaged, heat regulation may be upset for many days. Patients thus affected sometimes need to be surrounded by ice packs or to have frequently changed cold water bottles placed around them. Read the section on fluid balance ([see 6.5.3](#)).

6.7 Chemical burns

Many chemicals, particularly corrosives, may produce chemical burns when in contact with the skin or eyes or mucous membranes. These are very similar to burns from fire or electricity except that the chemical may be absorbed through the skin, causing general symptoms of poisoning. Some chemicals may be absorbed even if the skin surface is intact (see 4. 1. 2).

Diagnosis

- There is often a burning pain with redness at the site of contact.
- There may only be an irritating rash.
- In severe cases there may be blistering or a loss of skin and/or underlying tissue.
- Nausea, vomiting, headache, breathing difficulties and an abnormal mental state or the development of unconsciousness, all suggest absorption of the chemical.

RADIO FOR MEDICAL ADVICE.

Treatment

- Emergency treatment should be given as directed for skin (see 8. 1) and eyes (see 8. 2)
- Further treatment of less severe burns should be undertaken as follows.
- Wash your hands and forearms thoroughly and then remove the first-aid dressing to expose either a single burned area (in multiple burns) or a portion of a large single burn. The aim is to limit the areas of burned skin exposed at any one time to lessen both the risk of infection and the seepage of fluid. Clean the skin around the edges of the burn with soap, water and swabs. Clean away from the burn in every direction. **DO NOT** use cotton wool or other linty material for cleaning, as it is likely to leave bits in the burn.
- Leave blisters intact but clip off the dead skin by using a sterilized pair of scissors if blisters have burst. Flood the area with clean, warm, boiled water from a clean receptacle to remove debris. With a swab soaked in boiled warm water, dab gently at any remaining dirt or foreign matter in the burned area. Be *gentle*, as this will inevitably cause pain.
- Next cover the burn with the vaseline gauze dressing, overlapping the burn or scald by 50 to 100 mm (2 to 4 inches) according to its size. Now apply a covering of absorbent material to absorb any fluid leaking from the burn, e. g. a layer of sterile gauze, covered with a layer of sterile cotton

wool. This is held in place by a suitable bandage - tubular dressings or crepe bandage are useful for limbs and elastic net dressings for other areas.

- Thoroughly wash hands and arms before proceeding to deal as above with remainder of a large burn, or with another burn in the case of multiple burns.
- Dressings should be left undisturbed for a week unless the dressing becomes smelly or very dirty, or the temperature is raised. Re-dress such areas as above.
- If there is persistent pain, give paracetamol 1000 mg by mouth every 4 hours until the pain has been relieved. If there is severe pain, not relieved by the paracetamol, give morphine sulphate 7.5 mg (half an ampoule) intramuscularly and obtain medical advice by radio on further amount and frequency of morphine sulphate injections.
- Treat any complications of absorbed poison as appropriate:
 - Asphyxia (see 6. 1. 1).
 - Pulmonary oedema (see 6. 1. 2).
 - Heart failure (see 6. 2. 2).
 - Unconsciousness (see 6. 3. 1).
 - Liver failure (see 6. 4. 5).
 - Kidney failure (see 6. 5. 1).

Fluorescein staining

Staining the eye with fluorescein will highlight any area of corneal or conjunctival damage. Pull the lower eyelid downwards and draw the fluorescein paper strip, which contains the dye, gently across the inner moist surface of the lower lid with the patient looking upwards. This wipes the dye off the strip onto the lid and when the patient blinks a couple of times the dye spreads over the eye. Wipe any excess dye off the eyelids. Any area of corneal or conjunctival damage will attract the dye and be stained green. For further treatment see 8. 2.

6. 8 Frost-bite

If the skin is exposed to severe cold, particularly the fingers and toes, the tissue becomes frozen. The symptoms and signs are:

- The skin initially becomes red, but then turns white.
- The affected area is usually painless.
- It is hard to the touch.

If the affected area is left untreated, death of the tissue (gangrene) may well occur.

Treatment

- Warm the affected area quickly by placing it in water at a temperature of 42°C (107. 5°F) until it has thawed
- Keep the patient in a warm cabin.
- **DO NOT** massage the affected area.
- Severe pain may occur during the thawing. Give paracetamol 1000 mg by mouth. If this is not effective give morphine as directed (see 5. 6).
- Dress the area with sterile dry gauze.

If the area does not recover its normal colour and sensation after this treatment, **RADIO FOR MEDICAL ADVICE.**

7 GENERAL TOXIC HAZARDS

7.1 Chemical hazards from fire

Combustion of many chemicals may produce a wide range of substances, which are toxic.

These may be present at a distance from the main site of the fire, and may have no odour. Self-contained breathing apparatus should be used in approaching chemical fires.

The symptoms may include:

- Dizziness.
- Headache.
- Nausea and vomiting.
- A persistent cough and difficulty in breathing.
- Unconsciousness.

Inhalation of fumes may result in rapid collapse and unconsciousness, which should be treated as in 6. 3. 1. Pulmonary oedema (see 6. 1. 2) may develop after a few hours.

The main toxic chemicals, which may be produced, are listed below:

- Carbon dioxide (Table 615)
- Carbon monoxide (Table 616).

- Hydrochloric acid fumes ([Table 700](#)).
- Hydrogen cyanide ([Table 645](#)).
- Nitrogen oxides ([Table 610](#)).
(Particularly produced in smouldering fires.)

Treatment

The main danger from fume exposure is asphyxia ([see 6. 1. 1](#)). The patient should be:

- Removed rapidly to a fresh atmosphere.
- Given oxygen ([see 8. 3. 1](#)).
- Treated appropriately for asphyxia ([see 6. 1. 1](#)).

If burns are present as a result of the fire, they should be treated as for chemical burns ([see 6. 7](#)).

7.2 Hazards from welding

Symptoms of poisoning may arise during welding in confined spaces, if adequate precautions are not taken. The main danger is from nitrogen oxides ([Table 610](#)). Certain metal alloys, in particular those containing zinc or cadmium, give off fumes causing characteristic symptoms known as "metal fume fever". These usually do not develop for a period of 6 to 12 hours after exposure, and comprise:

- Shivering.
- Fever, headache and muscle pains.
- Nausea.
- A dry cough.

These symptoms usually resolve spontaneously without any treatment over the following 12 hours. Pulmonary oedema, however, may occur as a very rare complication ([see 6. 1. 2](#)).

If the patient is removed from any further exposure there are no lasting effects or recurrence.

7.3 Hazards from explosive chemicals

The main hazard is injury from explosion. Contact with explosives does not normally cause a medical problem from the chemicals themselves, unless they are in a decomposed state, when they may produce fumes, particularly of nitrogen oxides ([Table 610](#)), which may be inhaled.

- If the chemicals are in contact with the skin, they should be washed off with water as directed in 8. 1.
- If fumes are inhaled, the patient should be treated as directed in 8. 3.
- If signs and symptoms occur following exposure to explosive chemicals, **RADIO FOR MEDICAL ADVICE.**

7. 4 Hazards from radioactive materials

Radioactive materials may have two hazardous properties, one resulting from the radioactive nature of the material and the other from the chemical nature of the material. Either or both of these may be important.

The chemical effect on persons may be apparent more or less immediately. The effects of chemicals could be either poisoning or burns. They should be treated as appropriate to the chemical as described in section 9 (chemical tables).

The hazards from the radioactive nature of the material could be external radiation and internal radiation coming from contamination, inhalation and/or ingestion. The external radiation hazard may result when the material is separated from its shielding, or when the shielding is destroyed, whereas the contamination, inhalation and ingestion hazards may result if the containment for the material is violated.

7. 4. 1 ACTION

As a priority, a first step in providing protection from these hazards is to move persons as far away as possible from the source, prevent ingestion of contaminated food and water, use intervening structures (i) to shield external radiations and (ii) to minimize exposure to any released radioactive materials.

After removal from an affected area, contamination of personnel by radioactive materials should be dealt with in the following manner:

- Check the contaminated person for excessive bleeding, shock, cervical fracture or other life-threatening problem. In these cases, immediately undertake appropriate first aid before any other procedure. In case of disturbed respiration, use breathing assistance equipment if available, otherwise use mouth-to-mouth or mouth-to-nose artificial respiration. These activities are unlikely to result in significant contamination of individuals handling a contaminated person.
- Rescue personnel should be fully clothed, including hats and gloves, to minimize body areas exposed to contamination. Cotton or similar material is adequate. Heavy protective gear and breathing apparatus are not required unless dictated by the presence of fire or chemical hazards.
- Wrap stabilized or less injured victims in blankets to contain contamination.

- Remove victim's clothing and personal items which may be contaminated. Place items in plastic bag or sealed box, label, and hold in a secure area that is not near occupied space until assistance from a radiation expert is available to evaluate them. Treat major, but less than life-threatening, injuries at this time. Allow wounds/cuts that are not life threatening to bleed briefly, then treat.
- If the injuries of a patient do not prevent it, have the victim shower (or wash) thoroughly, including body, hair and eyes, as soon as practicable after being removed from the affected area. Mild detergents, including the use of soft brushes, may be used during showering and care should be taken to prevent the spread of contaminated washing water. Do not abrade the skin.
- Have victim blow nose, then gently swab nasal passages and ears to remove contaminated particles. Save swabs and nose blows, treat as if contaminated. Rinse mouth thoroughly.
- Apply first aid to minor injuries after decontamination wash.
- Have rescue personnel remove and store their clothing, as above, and thoroughly shower after completing assistance to victim. Also, store any towels, blankets, brushes, etc. used on victim in decontamination procedures.
- As far as possible, take a sample of urine of every person who has been in direct or indirect contact with the material, and keep it in any closed receptacle for further analysis.
- **RADIO FOR MEDICAL ADVICE.**
- Do not treat ingestion or inhalation of radioactive materials except on advice of a physician.

Further information concerning accidents involving radioactive materials is to be found in Emergency Schedules (EmS)* 7-01 to 7-09, to which reference should also be made.

8 EMERGENCY TREATMENT

8.1 Skin contact

If the chemical has affected the eyes, they should have **PRIOR** attention (see 8.2).

Remove contaminated clothing and shoes immediately. Wash off the chemical immediately with copious quantities of water for at least 10 minutes. Continue for a further 10 minutes if there is any evidence of chemicals still on the skin.

* IMO publication *Emergency Procedures for Ships Carrying Dangerous Goods*.

If there is evidence of a chemical burn, as demonstrated by redness and pain, remove the casualty to the sickbay without delay and give the treatment prescribed under 6. 7.

If there is no evidence of a chemical burn, check in the relevant chemical table to see whether absorption of the chemical through the intact skin is possible, causing general symptoms of poisoning (see 4. 1. 2). If such a possibility does exist, the patient should be kept under close observation for a period of not less than 24 hours, or longer if specified in the relevant technical table.

Give half a cup of water every 10 minutes to help replace fluid loss if the burn is other than small in area.

If burns are severe and extensive, **RADIO FOR MEDICAL ADVICE.**

8. 2 Eye contact

Wash the chemical out of the eye with copious amounts of water as quickly as possible. Keep the eyelids widely apart, as illustrated. This must be done thoroughly for 10 minutes, timed by the clock.



If there is any doubt whether the chemical has been completely removed, repeat the eyewash for a further 10 minutes.

RADIO FOR MEDICAL ADVICE.

If severe pain is experienced, physical restraint of the patient may be necessary in order to be certain of effective treatment. For treatment of pain, give 2 paracetamol tablets by mouth every 4 hours until the pain has been relieved. If there is very

severe pain, give morphine sulphate 7.5 mg (half an ampoule) intramuscularly and seek medical advice by radio.

Stain the eye with fluorescein.

If there is a particular area of the eye, which stains green with fluorescein, then tetracycline hydrochloride 1% eye ointment should be used. This will prevent the eyelid sticking to the eyeball.

Put the ointment into the eye every 2 hours and cover the eye with a dry gauze pad. Hold in place securely by using sticking plaster.

Treatment should be continued for 24 hours after the eye is no longer inflamed, and is white.

8.3 Inhalation

Remove the casualty at once from the polluted atmosphere - **ensure that rescuers are equipped with self-breathing apparatus so that they do not become the next casualties.**

Check that the casualty is breathing.

Tilt the head firmly backwards as far as it will go to relieve obstructed breathing. Listen for breathing with ear over nose and mouth.



Not breathing

- GIVE ARTIFICIAL RESPIRATION AT ONCE.
- GIVE CARDIAC COMPRESSION IF THE PULSE IS ABSENT.

Breathing and unconscious:

- Place the patient in the unconscious position (see 5. 3).
- Check to see if there is any obstruction in the mouth which will stop breathing.
- Pull the tongue forward.
- Suck or swap out excess secretions
- Clean any vomit from (he back or the throat.
- Remove any dentures.
- Insert a Guedel airway (see 5. 4) to prevent the tongue slipping back and obstructing the upper air passage; it should be left in place until the patient becomes conscious again.
- Give oxygen (see 8. 3. 1).
- Keep the patient warm.
- DO NOT GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PATIENT.
- DO NOT GIVE ALCOHOL, MORPHINE OR ANY STIMULANT.
- For further treatment of an unconscious patient see 5. 3 and the *IMGS*.

Breathing and conscious

The patient may be conscious, but having difficulty in breathing.

- Place the patient in the high sitting-up position keep him warm (see 5. 5).
- Give oxygen (see 8. 3. 1).

If the breathing does not improve despite these measures, then asphyxia (6. 1. 1) or pulmonary oedema (6. 1. 2) may have occurred.

If the patient's condition deteriorates rapidly, **RADIO FOR MEDICAL ADVICE**.

8. 3. 1 OXYGEN THERAPY

Warning: Smoking, naked light or fires must not be allowed in the same room during the administration of oxygen because of the risk of fire.

Oxygen is essential to life. It is given for treatment when the body is unable to get enough oxygen from the air because of damage to the lungs or because of other causes such as asphyxia (see 6. 1. 1)

Oxygen must be given with care since it can be dangerous to patients who have had breathing difficulties for a number of years due to lung disease, particularly

chronic bronchitis (see 6. 1. 3). Oxygen should be given only where advised in this Guide.

The accidents where a patient may require oxygen can be divided into two stages:

Stage 1 - *During rescue from the place of an accident*

During this time the patient should be connected to the portable oxygen apparatus through a mask placed over his face. The oxygen valve should be turned on and oxygen administered until the patient is transferred to the ship's sickbay.

If a portable oxygen apparatus is not available, air may be given by use of a self-contained breathing apparatus fitted with a separate airline.

Stage 2 - *The patient is in the ship's sick-bay*

The procedure should be followed as set out below:

The unconscious patient

- 1 Ensure that a clear airway has been established (see 5. 3) and a Guedel airway (see 5. 4) has been inserted.
- 2 Place over the nose and mouth a disposable mask, which is designed to give 35% oxygen to the patient. Ensure that it remains securely in place. Check that the equipment is correctly assembled according to manufacturer's instructions and that sufficient oxygen is contained in the cylinder.
- 3 Connect the mask to the flowmeter, using the tubing provided, and set the flowmeter to 4 litres per minute. This should be continued until the patient no longer has difficulty in breathing and has a healthy colour.

The conscious patient

- 1 Ask the patient whether he usually suffers from severe difficulty in breathing with a chronic cough, i. e. chronic bronchitis (see 6. 1. 3).
- 2 If the patient has severe chronic bronchitis, then he should be given only 24% oxygen, using a mask designed for this purpose, with the flowmeter set at 4 litres per minute.
- 3 All other patients should be given 35% oxygen, using a mask designed for this purpose, with the flowmeter set at 4 litres per minute.
- 4 The appropriate mask, as above, should be placed over the patient's mouth and nose and secured to remain correctly in place.
- 5 The patient should be placed in the high sitting-up position (see 5. 5).

- 6 Check that the equipment is correctly assembled according to the manufacturer's instructions and that sufficient oxygen is contained in the cylinder
- 7 the cylinder
- 8 Turn on the oxygen flowmeter to 4 litres per minute.

Oxygen therapy should be continued until the patient no longer has difficulty in breathing and has a healthy colour.

If the patient has difficulty in breathing, or the face, hands and lips remain blue for longer than 15 to 20 minutes, he probably has one of the following complications:

- Asphyxia (see 6. 1. 1).
- Pulmonary oedema (see 6. 1. 2).
- Bronchitis ana pneumonia (see 6. 1. 3 and 6. 1. 4).
- Circulatory collapse (see 6. 2. 1)

RADIO FOR MEDICAL ADVICE.

8. 4 Ingestion

DO NOT UNDER ANY CIRCUMSTANCE MAKE THE PATIENT VOMIT.

If unconscious

- Place in the unconscious position (see 5. 3).
- Check that the patient is breathing spontaneously.
- Give artificial respiration if he is not breathing.
- DO NOT GIVE ANYTHING BY MOUTH WHILST THE PATIENT IS UNCONSCIOUS
- DO NOT GIVE ALCOHOL, MORPHINE OR ANY STIMULANT.
- RADIO FOR MEDICAL ADVICE.

If conscious

If the chemical is corrosive

- Give 500 ml (1 pint) of water to drink as soon as possible if the poisoning is by:
 - PHOSPHORUS.
 - CHLORINATED HYDROCARBONS.
 - DECREASING SOLVENTS.

- **DO NOT GIVE MILK** with these chemicals.
- For poisoning by all other corrosive chemicals give 500 ml (1 pint) of milk to drink (or water, if milk is not available) as soon as possible.

If the chemical is non-corrosive

- Give two sachets (10 g) of activated charcoal dispersed in 500 ml (1 pint) of water, followed by three doses of one sachet (5 g) in 100 ml of water at intervals of 20 minutes.

If the chemical is not known

- Decide whether the chemical is corrosive or non-corrosive (see 4. 2) and treat appropriately as above.
- If it is not possible to decide whether the chemical is corrosive or not, then give 500 ml (1 pint) of water to drink.
- **RADIO FOR MEDICAL ADVICE.**

The patient should be kept warm in bed in all circumstances until he has recovered.

If severe pain and vomiting occur, see 6. 4. 1 and 6. 4. 2 for further advice and information, and **RADIO FOR MEDICAL ADVICE.**

Remember that vomit may be inhaled into the lungs, causing difficulty in breathing; if this occurs, treat as for inhalation (see 8. 3).

9 THE CHEMICAL TABLES

Table 100

ARSENIC AND COMPOUNDS

These chemicals are very toxic, and may cause death. Arsenic gas is produced if these chemicals are in contact with acids (Table 605).

Signs and symptoms	Treatment
<p><i>Skin contact</i> There is irritation with redness. In severe cases, blisters may form.</p> <p>These chemicals may be absorbed through the intact skin, causing general symptoms of poisoning similar to those produced by inhalation or ingestion (see below). This is particularly true of arsenic tribromide and arsenic trichloride.</p> <p><i>Eye contact</i></p> <p>Severe irritation with pain and redness of the eyes may occur.</p> <p><i>Inhalation</i></p> <p>There may be a dry mouth, difficulty in breathing and a persistent cough. In more severe cases, there may be a blue discoloration of the skin with shortness of breath. Pulmonary oedema and convulsions can occur.</p> <p><i>Ingestion</i></p> <p>There may be abdominal pain with vomiting. In more severe cases, convulsions can occur. Symptoms similar to those of inhalation (see above) may occur.</p>	<p><i>Skin contact</i> Emergency treatment: see 8. 1. If general symptoms occur, give dimercaprol as described for ingestion (see below).</p> <p><i>Eye contact</i> Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i> Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Convulsions: see 6. 3. 2.</p> <p>If general symptoms occur, give dimercaprol as described for ingestion (see below).</p> <p><i>Ingestion</i> Emergency treatment: see 8. 4. Convulsions: see 6. 3. 2.</p> <p>If general symptoms occur, give dimercaprol 200 mg intramuscularly every 6 hours for the first day, every 8 hours on the second day, and then twice a day for 3 days.</p> <p>RADIO FOR MEDICAL ADVICE.</p>

Table 101

CHLOROARSINES

General information

These chemicals are highly corrosive, as well as having the same toxic effects as arsenic (Table 100).

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i> There will be severe irritation and redness.</p> <p>Chemical burns can occur. These chemicals are absorbed through the intact skin, and may produce symptoms similar to those of inhalation (see below).</p> <p><i>Eye contact</i> There will be severe irritation and redness. Chemical burns can occur.</p> <p><i>Inhalation</i> In mild cases, there will be a cough, shortness of breath, nausea and vomiting. Severe exposure may produce breathlessness with frothy sputum (pulmonary oedema). In severe cases, weakness, convulsions and unconsciousness may occur.</p> <p><i>Ingestion</i> There will be abdominal pain with vomiting. In severe cases, weakness, unconsciousness and convulsions can occur.</p>	<p><i>Skin contact</i> Emergency treatment: see 8. 1.</p> <p>If general symptoms occur, give dimercaprol as described for ingestion (see below).*</p> <p><i>Eye contact</i> Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i> Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2.</p> <p>Convulsions: see 6. 3. 2.</p> <p>If general symptoms occur, give dimercaprol as described for ingestion (see below).</p> <p><i>Ingestion</i> Emergency treatment: see 8. 4. Convulsions: see 6. 3. 2.</p> <p>If general symptoms occur, give dimercaprol 200 mg intramuscularly every 6 hours for the first day, every 8 hours on the second day, and then twice a day for 3 days.</p>

Table 105**MERCURY AND COMPOUNDS****General information**

Mercury metal is not toxic except following prolonged exposure over a period of weeks. Inhalation of vapours of the metal may cause toxic symptoms shortly after exposure. Mercury compounds are highly toxic, and may particularly damage the kidneys and nervous system. They can accumulate in the body.

Signs and symptoms	Treatment
<p><i>Skin contact</i> Mild irritation of the skin can occur.</p> <p>These chemicals may be absorbed through the intact skin, causing symptoms similar to those of inhalation and of ingestion (see below).</p> <p><i>Eye contact</i> Mild irritation may occur.</p> <p><i>Inhalation</i> There may be a headache with increased salivation, and red painful gums. Kidney failure can develop after a few hours.</p> <p><i>Ingestion</i> There may be a metallic taste, pain in the stomach and severe vomiting and diarrhoea. Circulatory collapse and kidney failure may occur.</p>	<p><i>Skin contact</i> Emergency treatment: see 8. 1.</p> <p>If general symptoms occur, give dimercaprol as described for ingestion (see below)*.</p> <p><i>Eye contact</i> Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i> Emergency treatment: see 8. 3. Kidney failure: see 6. 5. 1.</p> <p>If general symptoms occur, give dimercaprol as described for ingestion (see below)*.</p> <p><i>Ingestion</i> Emergency treatment: see 8. 4. Circulatory collapse: see 6. 2. 1. Kidney failure: see 6. 5. 1.</p> <p>If general symptoms occur, give dimercaprol 200 mg intramuscularly every 6 hours for the first day, every 8 hours on the second day, and then twice a day for 3 days.</p> <p>RADIO FOR MEDICAL ADVICE.</p>

Table 110

LEAD AND COMPOUNDS

General information

These chemicals may cause damage to the brain and kidneys in particular. They accumulate in the body after exposure.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>Symptoms only occur after prolonged exposure.</p> <p><i>Eye contact</i></p> <p>No symptoms are likely to occur.</p> <p><i>Inhalation and ingestion</i></p> <p>Abdominal pain and constipation may occur. There may be a headache, followed by drowsiness, unconsciousness and convulsions in severe cases. Kidney failure can occur, after 2 or 3 days.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation and ingestion</i></p> <p>Emergency treatment: see 8. 3 and 8. 4. Convulsions: see 6. 3. 2. Kidney failure: see 6. 5. 1.</p> <p>If the casualty becomes unconscious or drowsy, or has convulsions, send to hospital ashore as soon as possible.</p> <p>RADIO FOR MEDICAL ADVICE.</p>

Table 111

LEAD TETRAETHYL AND LEAD TETRAMETHYL

General information

These chemicals are highly dangerous and are particularly toxic to the nervous system. They do not act in the same way as other lead compounds. Symptoms and signs may be delayed for up to one week following exposure.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>Irritation of the skin may occur. These compounds are easily absorbed through the intact skin, causing symptoms similar to those of inhalation (see below).</p> <p><i>Eye contact</i></p> <p>Redness and irritation may occur.</p> <p><i>Inhalation</i></p> <p>There will be a sudden onset of nausea, vomiting and headache with apathy, and mental confusion. More severe cases may develop severe agitation with violent aggressive behaviour. Convulsions and death can occur.</p> <p><i>Ingestion</i></p> <p>This may produce signs similar to those of inhalation, except there is often burning in the stomach followed by severe vomiting.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Convulsions: see 6. 3. 2. Acute mental disturbance: see 6. 3. 3.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p>

Table 115**CADMIUM AND COMPOUNDS****General information**

These chemicals are particularly irritative to the gut and lungs. They are generally toxic to the whole body. Death may occur after severe poisoning.

Signs and symptoms	Treatment
<p><i>Skin contact</i> A rash may occur.</p> <p><i>Eye contact</i> Irritation and redness may occur.</p> <p><i>Inhalation</i> There may be excessive salivation, lethargy, difficulty in breathing and a cough with pain in the chest. More severe poisoning will cause shortness of breath with frothy sputum (pulmonary oedema). These signs may not develop for 4 to 10 hours after exposure. Kidney failure and liver failure may occur.</p> <p><i>Ingestion</i> There may be nausea, vomiting, diarrhoea and headache. Kidney failure and liver failure can occur two or three days after exposure.</p>	<p><i>Skin contact</i> Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i> Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i> Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Kidney failure: see 6. 5. 1. Liver failure: see 6. 4. 5.</p> <p><i>Ingestion</i> Emergency treatment: see 8. 4. Kidney failure: see 6. 5. 1. Liver failure: see 6. 4. 5.</p>

Table 120

BARIUM AND COMPOUNDS

General information

These chemicals may be generally toxic to the whole body, but do not usually cause severe illness

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>Mild irritation only may occur.</p> <p><i>Eye contact</i></p> <p>Mild redness and irritation may occur.</p> <p><i>Inhalation</i></p> <p>Inhalation of the dust may cause a mild bronchitis with a cough and difficulty in breathing.</p> <p><i>Ingestion</i></p> <p>Nausea, diarrhoea and vomiting will occur. A staggering walk may develop followed by severe weakness and, rarely, convulsions.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>Bronchitis: see 6. 1. 3.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p> <p>Convulsions: see 6. 3. 2.</p>

Table 125

BERYLLIUM AND COMPOUNDS

General information

These chemicals are particularly toxic when inhaled or ingested. They are irritants of the lungs and skin, but there is a wide variation in response to exposure between individuals.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation following exposure. Severe itching and small blisters may occur later.</p> <p><i>Eye contact</i></p> <p>Severe irritation with redness may occur, as well as swelling of the eyelids.</p> <p><i>Inhalation</i></p> <p>There may be acute shortness of breath with frothy sputum (pulmonary oedema). Symptoms can be delayed for 1 to 2 days and include shortness of breath with a cough, yellow/green phlegm and a fever. This indicates the development of either bronchitis or pneumonia.</p> <p><i>Ingestion</i></p> <p>This rarely occurs, but may cause nausea and vomiting.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Bronchitis: see 6. 1. 3. Pneumonia: see 6. 1. 4.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p>

Table 130

ANTIMONY AND COMPOUNDS

General information

These chemicals are strong irritants of the skin and linings of the gut and lung. If they come into contact with acids, stibine gas is produced, which is extremely toxic (Table 606).

Antimony pentachloride and antimony trichloride reacts with water, forming hydrochloric acid, which acts as a corrosive (Table 700). Antimony pentafluoride reacts with water, forming hydrogen fluoride, which is severely corrosive (Table 750).

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and severe irritation with small septic blisters forming after a few hours. Chemical burns may occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p>
<p><i>Eye contact</i></p> <p>There may be severe redness and pain followed by darkening of the whites of the eyes, and deterioration of vision. Chemical burns may occur.</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>Shortness of breath with a cough, chest pain and a fever will occur. This may persist and become a chemical bronchitis. Nausea and vomiting may occur.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Bronchitis: see 6. 1. 3.</p>
<p><i>Ingestion</i></p> <p>There may be nausea, vomiting and severe diarrhoea. In severe cases, circulatory collapse can occur.</p>	<p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Circulatory collapse: see 6. 2. 1.</p>

Table 135

VANADIUM AND COMPOUNDS

General information

These chemicals are mainly irritants of the skin and lungs. They may be generally toxic to the whole body when ingested. Vanadium oxytrichloride, vanadium tetrachloride, and vanadium trichloride react with water, forming hydrochloric acid, which is corrosive (Table 700).

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation only.</p> <p><i>Eye contact</i></p> <p>There may be irritation with mild redness.</p> <p><i>Inhalation</i></p> <p>The casualty may complain of a metallic taste, and on occasions the tongue may become green after a few days. There is often a cough with difficulty in breathing and audible wheezing shortly after exposure. Rarely, severe shortness of breath with frothy sputum (pulmonary oedema) can occur.</p> <p><i>Ingestion</i></p> <p>There may be nausea and vomiting, with a metallic taste in the mouth.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2.</p> <p>Wheezing - If wheezing, administer oxygen and give two puffs of salbutamol (100 micrograms per puff) and five puffs of beclomethasone (50 micrograms per puff) every 15 minutes by spacer device for the first hour.</p> <p>At the same time SEEK MEDICAL ADVICE.</p> <p>Hospital treatment may be required.</p> <p>If wheezing continues after the first hour, continue with oxygen and give two puffs of salbutamol and five puffs of beclomethasone by spacer device every two hours for the next 12 hours, while awaiting medical advice. Then give two puffs four times a day of both salbutamol and beclomethasone if symptoms persist.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p>

Table 140**THALLIUM AND COMPOUNDS****General information**

These chemicals are extremely toxic to the whole body, particularly if ingested. The symptoms and signs may develop slowly over two or three days. If ingestion has occurred, the casualty should be transferred ashore for further treatment, since death may occur up to five weeks later.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>Mild irritation of the skin may occur. It is absorbed through the intact skin and may cause symptoms similar to those of ingestion. If these occur, treat as for ingestion.</p> <p><i>Eye contact</i></p> <p>Mild redness and irritation will occur.</p> <p><i>Inhalation</i></p> <p>This rarely occurs, but may cause signs and symptoms similar to those of ingestion (see below).</p> <p><i>Ingestion</i></p> <p>There will be nausea, abdominal pain and vomiting. Occasionally there may be blood in the vomit. After 2 or 3 days, progressive weakness, difficulty in walking and "pins and needles" in the legs and arms may develop. Increasing mental disturbance and confusion may follow. Liver failure and kidney failure can occur. A characteristic sign is the progressive loss of hair, which may be rapid. Convulsions can occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Give two sachets (10 g) of activated charcoal dispersed in 500 ml (1 pint) of water, followed by three doses of one sachet (5 g) in 100 ml of water at intervals of 20 minutes.</p> <p>Bleeding: see 6. 4. 3. Liver failure: see 6. 4. 5.</p> <p>Kidney failure: see 6. 5. 1. Convulsions: see 6. 3. 2.</p> <p>RADIO FOR MEDICAL ADVICE.</p>

Table 145

ZINC AND COMPOUNDS

General information

These chemicals are irritative to the skin and lungs. Zinc chloride is particularly toxic and may cause severe chemical burns. Zinc resinate is not as toxic.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be severe chemical burns of the skin with pain and redness.</p> <p><i>Eye contact</i></p> <p>Severe pain, redness and irritation will occur. There may be chemical burns of the eye in serious cases.</p> <p><i>Inhalation</i></p> <p>There will be a cough, sneezing and copious sputum production. There may be severe difficulty in breathing, with tightness and pain in the chest. Severe breathlessness with frothy sputum (pulmonary oedema) can occur. Bronchitis may develop after 2 or 3 days in less severe cases.</p> <p><i>Ingestion</i></p> <p>This is unlikely to occur, but will produce swelling of the linings of the throat with nausea and vomiting. Circulatory collapse may occur.</p>	<p><i>Skin contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED. Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED. Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Bronchitis: see 6. 1. 3.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Circulatory collapse: see 6. 2. 1.</p>

Table 150**COPPER AND COMPOUNDS****General information**

These chemicals are irritative to the skin and lungs. They are particularly toxic after ingestion.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be severe pain with redness. Chemical burns can occur in severe cases.</p> <p><i>Eye contact</i></p> <p>There may be severe irritation with redness and pain. Chemical burns can occur.</p> <p><i>Inhalation</i></p> <p>There is usually a persistent cough with sneezing, soreness of the throat and aching in the muscles, which develops 2 or 3 hours after exposure. These often resolve spontaneously within 24 hours.</p> <p><i>Ingestion</i></p> <p>There may be burning in the throat, with nausea, diarrhoea and vomiting. Blood may be present in the vomit or diarrhoea. In severe cases, liver and kidney damage can occur.</p> <p>Convulsions are a rare complication.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p> <p>Bleeding: see 6. 4. 3.</p> <p>Liver failure: see 6. 4. 5.</p> <p>Kidney failure: see 6. 5. 1.</p> <p>Convulsions: see 6. 3. 2.</p>

Table 155**CHROMIUM AND COMPOUNDS****General information**

These chemicals are corrosive to the skin. They are extremely toxic if ingested in sufficient quantities.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be severe pain with redness and chemical burns of the skin. If the chemical is not removed promptly, progressive painful ulcers will occur.</p> <p><i>Eye contact</i></p> <p>There may be redness and pain. Chemical burns of the eye can occur in serious cases.</p> <p><i>Inhalation</i></p> <p>There may be difficulty in breathing, with chest pain and wheezing. In more severe cases, shortness of breath with frothy sputum can occur (pulmonary oedema).</p> <p><i>Ingestion</i></p> <p>There will be severe vomiting and diarrhoea with abdominal pain. Occasionally, blood may be present in the vomit or faeces. In severe cases, liver and kidney failure may occur.</p>	<p><i>Skin contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2.</p> <p>Wheezing - If wheezing, administer oxygen and give two puffs of salbutamol (100 micrograms per puff) and five puffs of beclomethasone (50 micrograms per puff) every 15 minutes by spacer device for the first hour. At the same time SEEK MEDICAL ADVICE. Hospital treatment may be required. If wheezing continues after the first hour, continue with oxygen and give two puffs of salbutamol and five puffs of beclomethasone by spacer device every two hours for the next 12 hours, while awaiting medical advice. Then give two puffs four times a day of both salbutamol and beclomethasone if symptoms persist.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Bleeding: see 6. 4. 3. Liver failure: see 6.4.5.</p> <p>Kidney failure: see 6. 5. 1.</p>

Table 160

LITHIUM AND COMPOUNDS

General information

These chemicals are toxic because lithium acts on the nervous system. In addition to this, the compounds may be corrosive, particularly lithium hydroxide, causing severe chemical burns of the skin.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation. In severe cases, pain with chemical burns can occur.</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation, with chemical burns if the case is severe. Permanent damage to the eyes may occur.</p> <p><i>Inhalation</i></p> <p>There may be difficulty in breathing, with a cough and chest pain. In more severe cases, shortness of breath with frothy sputum (pulmonary oedema) can occur. Agitation, confusion and unconsciousness may develop even if there is no difficulty in breathing.</p> <p><i>Ingestion</i></p> <p>There is often nausea, vomiting and confusion. In severe cases, there may be blurring of vision, muscle twitching, confusion and progressive unconsciousness.</p>	<p><i>Skin contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED. Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED. Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p>

Table 165

METAL CARBONYLS

General information

These chemicals are extremely toxic, particularly if inhaled. There may be no smell or taste in the mouth as a warning of their presence. If severe symptoms do occur, the casualty should be transferred ashore since the period of illness and recovery is prolonged.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There will be redness and irritation. These compounds may be absorbed through the intact skin, producing symptoms similar to those of inhalation (see below).</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1. If general symptoms occur, give dimercaprol as described for ingestion (see below).</p>
<p><i>Eye contact</i></p> <p>There may be redness and irritation.</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>Initial symptoms can include nausea, headache, dizziness and vomiting. These may improve, but after 12 to 36 hours the casualty may develop difficulty in breathing, with chest pain and a cough. In severe cases, weakness and breathlessness with frothy sputum (pulmonary oedema) can occur. Convulsions may rarely occur.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Convulsions: see 6.3.2. If severe symptoms occur, give dimercaprol as described for ingestion (see below)*.</p>
<p><i>Ingestion</i></p> <p>There will be nausea and vomiting. Shortness of breath with frothy sputum (pulmonary oedema) and circulatory collapse may occur.</p>	<p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Pulmonary oedema: see 6. 1. 2. Circulatory collapse: see 6. 2. 1.</p> <p>Give dimercaprol 200 mg intramuscularly every 6 hours for the first day, every 8 hours on the second day, and then twice a day for 3 days.</p>

Table 170

METAL ALKYL

General information

These chemicals have a corrosive action. They are mainly a hazard because they ignite spontaneously in air, and are explosive, causing burns. They may produce toxic fumes after ignition.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and pain with chemical burns of the skin.</p> <p><i>Eye contact</i></p> <p>There may be redness and pain. Severe chemical burns can occur.</p> <p><i>Inhalation</i></p> <p>There may be severe shortness of breath, which can progress in severe cases to breathlessness with frothy sputum (pulmonary oedema).</p> <p>Convulsions may occur.</p> <p><i>Ingestion</i></p> <p>This is unlikely to occur, but there will be severe burning of the mouth and throat with pain. This may be followed by nausea and vomiting.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Convulsions: see 6.3.2.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p>

Table 175

SELENIUM AND COMPOUNDS

General information

These chemicals are generally toxic to the whole body. In addition, they are irritants of the skin and lungs. Selenium hexafluoride and hydrogen selenide are gases, and are extremely toxic if inhaled.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation of the skin.</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation. Chemical burns can occur in severe cases.</p> <p><i>Inhalation</i></p> <p>There may be a metallic taste in the mouth and a garlic odour to the breath. Muscle pains with a mild fever can occur a few hours after exposure. In severe cases, shortness of breath with frothy sputum (pulmonary oedema) may develop. Occasionally, wheezing and shortness of breath may occur.</p> <p><i>Ingestion</i></p> <p>There will be nausea and vomiting, occasionally with blood. Black faeces may be passed, indicating bleeding from the gut. Liver and kidney failure may develop after 2 or 3 days.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2.</p> <p>Wheezing - If wheezing, administer oxygen and give two puffs of salbutamol (100 micrograms per puff) and five puffs of beclomethasone (50 micrograms per puff) every 15 minutes by spacer device for the first hour.</p> <p>At the same time SEEK MEDICAL ADVICE. Hospital treatment may be required. If wheezing continues after the first hour, continue with oxygen and give two puffs of salbutamol and five puffs of beclomethasone by spacer device every two hours for the next 12 hours, while awaiting medical advice. Then give two puffs four times a day of both salbutamol and beclomethasone if symptoms persist.</p> <p>RADIO FOR MEDICAL ADVICE.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Bleeding: see 6. 4. 3. Liver failure: see 6. 4. 5.</p> <p>Kidney failure: see 6. 5. 1.</p>

Table 181

OSMIUM TETROXIDE

General Information

This chemical is a severe irritant of the skin and lungs.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There will be redness and irritation.</p> <p><i>Eye contact</i></p> <p>There will be redness and irritation. The vapour causes a gritty feeling in the eyes, redness and watering, and the casualty may notice the appearance of rings around lights.</p> <p><i>Inhalation</i></p> <p>In low concentrations, there will be a cough, slight breathlessness and watering of the eyes, with a headache. In severe cases, shortness of breath with frothy sputum (pulmonary oedema) may occur. Kidney damage is a late complication.</p> <p>Note: The onset of pulmonary oedema may be delayed for up to 72 hours.</p> <p><i>Ingestion</i></p> <p>There will be nausea and vomiting. Kidney failure may occur in severe cases.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6.1.2. Kidney failure: see 6.5.1</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Kidney failure: see 6. 5. 1.</p>

Table 200

PHOSPHORUS (YELLOW or WHITE)

General information

These chemicals are extremely toxic, particularly to the liver, and have a severe corrosive action. They may burn spontaneously on contact with air, and the vapour released is highly irritating to the lungs.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be severe pain, redness and burns. If the contact is prolonged, a deep, painful chemical burn will be produced.</p>	<p><i>Skin contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>Emergency treatment: see 8. 1.</p> <p>Keep the injured part of the body under water or covered with wet dressings and remove the phosphorus with a spoon, spatula or tweezers.</p>
<p><i>Eye contact</i></p> <p>There will be severe pain and redness with chemical burns if the solid is in contact with the eyes. The fumes cause redness and irritation, and occasionally chemical burns in severe exposure.</p>	<p><i>Eye contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>There will be a cough with shortness of breath and chest pain. Rarely, shortness of breath with frothy sputum (pulmonary oedema) may occur. The chemical may be absorbed into the body, producing nausea and vomiting, a garlic odour of the breath, and loss of appetite. Liver failure can occur.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>Pulmonary oedema: see 6. 1. 2.</p> <p>Liver failure: see 6. 4. 5.</p> <p>Persistent vomiting: see 6. 4. 2.</p>
<p><i>Ingestion</i></p> <p>This is unlikely to occur. There will be burns of the mouth and throat with vomiting. In severe cases, blood may be vomited. Symptoms similar to those of inhalation can occur (see above).</p>	<p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p> <p>Bleeding: see 6. 4. 3.</p>

Table 205

PHOSPHIDES

General information

These chemicals are irritative to the skin and lungs. If they are brought into contact with acids or water, hydrogen phosphide (phosphine) is produced, which is a highly toxic gas (Table 601).

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation. Small septic blisters may form.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p>
<p><i>Eye contact</i></p> <p>There may be redness and irritation. Chemical burns can occur.</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>There may be a garlic odour to the breath with dizziness and muscle pains. There is often a cough with shortness of breath, nausea, vomiting and diarrhoea.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p>
<p><i>Ingestion</i></p> <p>There may be nausea, vomiting and diarrhoea, with excessive thirst.</p>	<p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p>

Table 210

CARBON SULPHIDES

General information

These chemicals are toxic to the nervous system. They have a strong foul odour.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be extreme irritation with a rash and blisters. They are absorbed through the intact skin, causing symptoms similar to inhalation (see below).</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p>
<p><i>Eye contact</i></p> <p>There may be severe irritation. Chemical burns may occur.</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>In mild cases, there may be nausea, headache, lethargy and drowsiness. In more severe cases there will be general muscular weakness, difficulty in speaking, unsteadiness in walking, loss of consciousness and occasionally convulsions. Death may occur. Rarely, there may be severe agitation with aggressive behaviour. Liver and kidney failure can occur.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Acute mental disturbance: see 6. 3. 3.</p> <p>Convulsions: see 6. 3. 2.</p> <p>Liver failure: see 6. 4. 5. Kidney failure: see 6. 5. 1.</p>
<p><i>Ingestion</i></p> <p>This is unlikely to occur, but if it does, may produce severe nausea and vomiting followed by unconsciousness. Convulsions may occur. Liver and kidney failure can develop as late complications.</p>	<p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Convulsions: see 6. 3. 2.</p> <p>Liver failure: see 6. 4. 5. Kidney failure: see 6. 5. 1.</p>

Table 215

CYANIDES AND NITRILES

General information

These chemicals are extremely toxic. They are generally toxic to the whole body. If exposure occurs, treatment must be given immediately, since death may occur very rapidly. Nitrites contain cyanide and therefore act in the same way. If inorganic cyanides are brought into contact with acids, hydrogen cyanide is produced (Table 645)

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be irritation and pain.</p> <p>Chemical burns can occur. These chemicals are absorbed through the intact skin, producing similar signs to those of inhalation and ingestion (see below).</p> <p><i>Eye contact</i></p> <p>There may be irritation and redness. Chemical burns can occur.</p> <p><i>Inhalation and ingestion</i></p> <p>There may be chest pain with shortness of breath, anxiety and rapid loss of consciousness. Convulsions may occur and in severe cases death can occur within 30 minutes. The patient may have a smell of bitter almonds on his breath.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p>If general symptoms occur, treat as described for inhalation and ingestion (see below).</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation and ingestion</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>If the patient is conscious, he should be placed flat on his back, and rest quietly under supervision.</p> <p>If the patient is unconscious, place in the unconscious position and insert a Guedel airway (see 5. 4). Start artificial respiration by the Silvester method (see 5. 3) and heart compression (see 5. 3) if breathing has stopped and the pulse cannot be felt. If the breathing and pulse are present, break an ampoule of amyl nitrite 0.17 mg into a handkerchief or cloth, and hold under the casualty's nose so that he inhales the vapour. This should be repeated with a further ampoule at 3-minute intervals, using up to five ampoules.</p> <p>Emergency treatment: see 8. 3 and 8. 4.</p> <p>Convulsions: see 6. 3. 2.</p>

Table 220

AZIDES

General information

These chemicals are extremely toxic to the whole body, and may cause death. They have a corrosive action.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation. Chemical burns can occur.</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation. Chemical burns can occur.</p> <p><i>Inhalation</i></p> <p>There may be shortness of breath with a cough and chest pain. More severe cases may develop shortness of breath with frothy sputum (pulmonary oedema). Similar symptoms to those of ingestion may occur (see below).</p> <p><i>Ingestion</i></p> <p>There may be nausea and vomiting with a burning sensation in the mouth. In more severe cases, there is pallor of the skin, a weak pulse, sweating and circulatory collapse. Convulsions may rarely occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Circulatory collapse: see 6. 2. 1. Convulsions: see 6.3.2.</p>

Table 225

SULPHIDES

General information

These chemicals are irritants of the skin and lungs. Some may be extremely toxic because, on contact with water and acids, they produce hydrogen sulphide (Table 640), which has a strong foul odour.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation. Chemical burns can occur rarely.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p>
<p><i>Eye contact</i></p> <p>There may be redness and irritation. Chemical burns can occur.</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>There will be burning of the mouth and throat with shortness of breath, nausea and vomiting. In severe cases, breathlessness with frothy sputum (pulmonary oedema) may develop. Rarely, convulsions can occur.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Convulsions: see 6. 3. 2.</p>
<p><i>Ingestion</i></p> <p>This will produce nausea and vomiting, headache and difficulty in breathing. In severe cases, there may be trembling of the hands and legs, loss of consciousness, circulatory collapse and convulsions. Death may occur.</p>	<p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Circulatory collapse: see 6. 2. 1. Convulsions: see 6. 3. 2. RADIO FOR MEDICAL ADVICE.</p>

Table 230

OXALATES

General information

These chemicals are corrosive and are generally toxic to the whole body. They particularly damage the kidneys if ingested.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and chemical burns of the skin.</p> <p><i>Eye contact</i></p> <p>There may be pain and redness. Chemical burns can occur.</p> <p><i>Inhalation</i></p> <p>There may be shortness of breath with a cough. In more severe cases, symptoms similar to those of ingestion may develop (see below).</p> <p><i>Ingestion</i></p> <p>There may be abdominal pain and vomiting followed by weakness and convulsions. Circulatory collapse can occur. If there is severe poisoning, kidney failure may develop.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p><i>Ingestion</i></p> <p>Give calcium gluconate effervescent tablets 5 g in 250 ml (1/2 pint) of water to drink immediately.</p> <p>Emergency treatment: see 8. 4.</p> <p>Kidney failure: see 6. 5. 1.</p> <p>Convulsions: see 6. 3. 2.</p> <p>Circulatory collapse: see 6. 2. 1.</p>

Table 235**NITRATES AND NITRITES****General information**

These chemicals act on the blood, producing asphyxia and circulatory collapse in severe cases. Silver nitrate has a corrosive action, and may produce chemical burns of the eyes and skin.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation. They are absorbed through the intact skin, producing symptoms similar to those of inhalation and ingestion (see below).</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation.</p> <p><i>Inhalation* and ingestion</i></p> <p>They will produce a headache, flushing of the skin, vomiting and dizziness. In more severe cases there may be a weak pulse and circulatory collapse. Loss of consciousness, convulsions and death may occur</p> <p>The nitrites may cause blueness of the skin and mouth (cyanosis), with a reddish-brown discoloration of the urine. This is due to damage of the blood cells (methaemoglobinaemia).</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation and ingestion</i></p> <p>Emergency treatment: see 8. 3 and 8. 4. Circulatory collapse: see 6. 2. 1.</p> <p>Convulsions: see 6. 3. 2. Methaemoglobinaemia</p> <p>If signs of this condition are present, and the patient is conscious, give 20 ml of methylene blue 1% by mouth. Also give 1 g of ascorbic acid by mouth and repeat every 4 hours for 24 hours. If the patient is unconscious, give 5 ml of 10% ascorbic acid intramuscularly.</p> <p>RADIO FOR MEDICAL ADVICE.</p>

* For inhalation of decomposition fumes, apply [Table 610](#), Inhalation signs and symptoms.

Table 240

BORIC ACID AND BORATES

General information

These chemicals are not particularly toxic. They are mild irritants.

Signs and symptoms	Treatment
<i>Skin contact</i> There may be mild redness and irritation.	<i>Skin contact</i> Emergency treatment: see 8. 1.
<i>Eye contact</i> There may be mild redness and irritation.	<i>Eye contact</i> Emergency treatment: see 8. 2.
<i>Inhalation</i> There may be slight shortness of breath with a cough, and soreness of the throat.	<i>Inhalation</i> Emergency treatment: see 8. 3.
<i>Ingestion</i> There may be nausea and vomiting only.	<i>Ingestion</i> Emergency treatment: see 8. 4.

Table 245

BORANES

General information

These chemicals are extremely toxic to the nervous system and may cause death. Some are corrosive to skin, mouth, throat and lungs. The liquids may ignite spontaneously, causing burns of the skin.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<i>Skin contact</i> There may be severe pain and redness. Chemical burns can occur. They are absorbed through the intact skin, causing symptoms similar to those of inhalation (see below). <i>Eye contact</i> There may be severe pain and redness. <i>Inhalation</i> The onset of symptoms may be delayed for up to 24 hours. Mild exposure causes lethargy, confusion, headache and a feeling of constriction in the chest. More severe exposure may give slurred speech, drowsiness, trembling of the hands with muscle spasms, unconsciousness and convulsions. Breathlessness with frothy sputum (pulmonary oedema) may occur. Kidney and liver failure can occur. <i>Ingestion</i> There may be nausea and vomiting. Symptoms similar to those of inhalation may occur (see above).	<i>Skin contact</i> IMMEDIATE ACTION IS REQUIRED. Emergency treatment: see 8. 1. <i>Eye contact</i> IMMEDIATE ACTION IS REQUIRED. Emergency treatment: see 8. 2. <i>Inhalation</i> Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Convulsions: see 6.3.2. Kidney failure: see 6. 5. 1. Liver failure: see 6. 4. 5. <i>Ingestion</i> Emergency treatment: see 8. 4.

Table 300

ALDEHYDES AND KETONES

General information

These chemicals are irritants of the skin and lungs. They also affect the nervous system. Chloral and chloroacetaldehyde are particularly toxic, causing rapid loss of consciousness.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation.</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation. Chemical burns rarely occur.</p> <p><i>Inhalation</i></p> <p>Mild exposure will cause a cough, with shortness of breath. Prolonged exposure can cause breathlessness with frothy sputum (pulmonary oedema). This may be delayed in onset. Bronchitis can develop as a complication.</p> <p><i>Ingestion</i></p> <p>There may be nausea and vomiting. More severe cases may lose consciousness and occasionally develop convulsions.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Bronchitis: see 6. 1. 3.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8.4. Convulsions: see 6. 3. 2.</p>

Table 305

ALCOHOLS

General information

These chemicals have a relatively low toxicity except in high concentrations. They cause depression of the nervous system and symptoms similar to those of "drunkenness". The features of alcohol intoxication are well known, and are described with appropriate medical treatment in the *IMGS*.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be mild irritation.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p>
<p><i>Eye contact</i></p> <p>There may be mild irritation and redness.</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>There may be shortness of breath, with a cough. They can be absorbed through the lungs, producing symptoms similar to those of ingestion (see below).</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p>
<p><i>Ingestion</i></p> <p>There may be mental confusion, a staggering walk and slurred speech. In more severe cases, there is a loss of consciousness and, rarely, convulsions.</p>	<p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Convulsions: see 6. 3. 2.</p>

Table 306**METHYL ALCOHOL (METHANOL)****General information**

This chemical is dangerous because it is converted in the body into toxic substances, which may damage the eyes and nervous system.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There will be mild redness and irritation.</p> <p>It may be absorbed through the intact skin, producing symptoms similar to those of ingestion (see below).</p> <p><i>Eye contact</i></p> <p>There may be mild irritation and redness only.</p> <p><i>Inhalation</i></p> <p>It is absorbed through the lungs, and produces symptoms similar to those of ingestion (see below). Mild shortness of 1 breath may occur.</p> <p><i>Ingestion</i></p> <p>The patient will initially appear to be "drunk". There then may be a delayed period of 18 to 48 hours after which nausea, vomiting, abdominal pain and confusion may occur. The vision may deteriorate and blindness can occur in severe cases. There may be muscle weakness with "pins and needles" in the arms and legs. Severe poisoning leads to unconsciousness and occasionally death.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p>If general symptoms occur, treat as described for ingestion (see below).</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>If general symptoms occur, treat as described for ingestion (see below).</p> <p><i>Ingestion</i></p> <p>Give 300 ml of 10% ethyl alcohol solution to drink every 3 hours for 2 days. Alternatively, 125 ml of any strong alcoholic drink diluted 1 in 4 with water may be given in a similar manner. This treatment may result in drowsiness.</p> <p>Emergency treatment: see 8. 4.</p>

Table 307

ALLYL ALCOHOL

General information

This chemical is an irritant to the skin and lungs. It is generally toxic to the whole body.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation with blistering of the skin.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p>
<p><i>Eye contact</i></p> <p>There may be redness and irritation. Chemical burns can occur.</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>There may be a cough with watering of the eyes, sneezing and shortness of breath. Symptoms similar to those of ingestion rarely occur following severe exposure.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p>
<p><i>Ingestion</i></p> <p>There will be nausea and vomiting, and the casualty appears to be "drunk". In severe cases, unconsciousness may occur.</p>	<p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p>

Table 308
ANTIFREEZE (ETHYLENE
GLYCOL)

General information

This chemical is particularly dangerous if it is ingested. It is generally toxic to the whole body. Serious cases require special treatment and should be transferred ashore as soon as possible.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be irritation and redness. It is absorbed through the skin and can cause symptoms similar to those of ingestion (see below).</p> <p><i>Eye contact</i></p> <p>There may be irritation and redness.</p> <p><i>Inhalation</i></p> <p>There may be a cough, sneezing and mild shortness of breath. Symptoms can develop similar to those of ingestion (see below).</p> <p><i>Ingestion</i></p> <p>The patient will initially appear to be "drunk". There is often a short period of improvement, but progressive coma then occurs. There may be shortness of breath. Kidney failure can occur, 6 to 12 hours after ingestion.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1. If general symptoms occur, treat as described for ingestion (see below).</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. If general symptoms occur, treat as described for ingestion (see below).</p> <p><i>Ingestion</i></p> <p>Give 300 ml of 10% ethyl alcohol solution to drink every 3 hours for 2 days. Alternatively, 125 ml of any strong alcoholic drink diluted 1 in 4 may be given. This treatment may result in drowsiness. It is important that medical advice be obtained as soon as possible.</p> <p>Emergency treatment: see 8. 4. Kidney failure: see 6. 5. 1.</p>

Table 310**HYDROCARBONS****General information**

These chemicals act mainly on the nervous system, causing drowsiness and unconsciousness. In high concentrations they are irritants of the skin and lungs

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation. Blisters can form in severe cases.</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation.</p> <p><i>Inhalation</i></p> <p>At low concentrations, there is a cough, soreness of the throat, sneezing and mild shortness of breath. In more severe cases, bronchitis and pneumonia may occur after 24 hours. In very severe exposure, shortness of breath with frothy sputum (pulmonary oedema) can occur. If the chemical is absorbed through the lungs there will be drowsiness, mental agitation, or unconsciousness.</p> <p>Convulsions are a rare complication.</p> <p><i>Ingestion</i></p> <p>This is unlikely to occur, but unconsciousness may follow a severe case of ingestion. Nausea and vomiting is likely to occur. Fumes may be inhaled from these chemicals after ingestion, producing the same symptoms as for inhalation (see above).</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2.</p> <p>Bronchitis: see 6. 1. 3. Pneumonia: see 6.1.4. Convulsions: see 6. 3. 2. Mental agitation: see 6. 3. 3.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p>

Table 311

HYDROCARBONS - PETROLEUM, PETROLEUM PRODUCTS AND GASES

General information

These chemicals produce toxic fumes which may cause asphyxia. They also have a direct action on the nervous system.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be mild redness and irritation.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p>
<p><i>Eye contact</i></p> <p>There may be mild redness and irritation.</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>In low concentrations, early symptoms will be confusion, headaches, dizziness and nausea. In high concentrations, there will be a rapid onset of mental confusion, "drunken behaviour", unconsciousness and, rarely, convulsions. Pneumonia may develop over 24 hours.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Convulsions: see 6. 3. 2. Pneumonia: see 6. 1. 4. Mental confusion: see 6. 3. 3.</p>
<p><i>Ingestion</i></p> <p>There will be nausea and vomiting with irritation in the mouth and throat. Drowsiness may occur. Fumes can be inhaled from the stomach following ingestion, causing bronchitis.</p>	<p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Bronchitis: see 6. 1. 3.</p>

Table 312

BENZENE

General information

This chemical has a strong depressive effect on the nervous system, causing unconsciousness. Prolonged and repeated exposure may cause damage to the blood. If exposure is suspected, a sample of urine should be kept in a deep freeze, if available, for analysis later.

Death may occur in severe cases.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation. It is absorbed through the skin, producing symptoms similar to those of inhalation (see below).</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p>
<p><i>Eye contact</i></p> <p>There may be redness and irritation.</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>In low concentrations, there will be nausea, headache, and vomiting. In higher concentrations there may be a staggering walk and mental confusion. Very severe exposure may result in unconsciousness and death.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Mental confusion: see 6. 3. 3.</p>
<p><i>Ingestion</i></p> <p>This is unlikely to occur, but will cause symptoms similar to those of inhalation (see above).</p>	<p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p>

Table 313

TURPENTINE

General information

This chemical is toxic to the nervous system, as well as being a severe irritant to the eyes.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation. Absorption through the intact skin can occur, causing symptoms similar to those of inhalation (see below).</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation. Chemical burns can occur.</p> <p><i>Inhalation</i></p> <p>There will be a cough with soreness of the mouth and throat. Mild shortness of breath may occur. There may be nausea, dizziness, difficulty in walking and, in severe cases, unconsciousness. Breathing may stop.</p> <p>Convulsions can occur rarely.</p> <p><i>Ingestion</i></p> <p>There will be nausea and vomiting. Severe cases may cause symptoms similar to those of inhalation (see above). In very rare cases, kidney failure is a late complication.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8.3. Convulsions: see 6. 3. 2.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Kidney failure: see 6. 5. 1.</p>

Table 314

NAPHTHALENE

General information

This chemical is toxic to the blood and kidneys. If severe symptoms occur following ingestion, the casualty should be transferred ashore as soon as possible.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p>
<p><i>Eye contact</i></p> <p>There may be redness and irritation. Mild injury to the surface of the eye can occur. In severe cases, blurring of the vision may develop.</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>There may be shortness of breath, with a cough. It is absorbed through the lungs and in serious cases produces signs similar to those of ingestion (see below).</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p>
<p><i>Ingestion</i></p> <p>There is often headache, nausea, vomiting, abdominal pain and profuse sweating. It may be painful to pass urine. In more severe cases disruption of the blood cells (haemolysis) can occur, giving a yellow colour to the skin. The urine will then become dark in colour and blood may be present in it. Kidney failure may follow as a complication within a few hours.</p>	<p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Kidney failure: see 6. 5. 1.</p> <p>RADIO FOR MEDICAL ADVICE.</p>

Table 315

DIMETHYL SULPHATE AND DIETHYL SULPHATE

General information

These chemicals have a strong corrosive action. Dimethyl sulphate is an extremely irritant chemical and is highly toxic. Diethyl sulphate may cause similar symptoms, but is not as dangerous. The onset of symptoms may be delayed for up to 10 hours. The patient should be transferred ashore as soon as possible.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There will be severe chemical burns of the skin with pain and blistering. Absorption through the intact skin occurs even with brief contact. Symptoms similar to those of inhalation may develop after a period of 10 hours (see below).</p> <p><i>Eye contact</i></p> <p>There may be severe pain, redness and chemical burns.</p> <p><i>Inhalation</i></p> <p>Initially, there is often only soreness of the mouth and throat. There may be a delay of a few hours before the onset of headache, dizziness, an aversion to looking at lights, and swelling of the face and around the eyes. This may be associated with difficulty in breathing, blueness and circulatory collapse. Breathlessness with frothy sputum (pulmonary oedema) can occur. Kidney and liver damage may develop after 2 or 3 days.</p> <p><i>Ingestion</i></p> <p>There will be severe chemical burns of the mouth and throat. Symptoms similar to those of inhalation may occur (see above).</p>	<p><i>Skin contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED. Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Circulatory collapse: see 6. 2. 1. Pulmonary oedema: see 6. 1. 2. Kidney failure: see 6. 5. 1. Liver failure: see 6. 4. 5.</p> <p>If severe difficulty in breathing occurs, with swelling of the face, give chlorphenamine (chlorpheniramine) 10 mg intramuscularly.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p>

Table 320

ALIPHATIC AMINES

General information

These chemicals are severe irritants of the skin and lungs. Allylamine is particularly toxic.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be severe redness, irritation and pain. Chemical burns can occur with many of these chemicals.</p> <p><i>Eye contact</i></p> <p>There may be severe irritation and redness, followed by blurring of vision. This is due to swelling of the linings of the eye (corneal oedema). Chemical burns can occur.</p> <p><i>Inhalation</i></p> <p>There may be flushing of the face, nausea, dizziness and headache. There will be shortness of breath and a cough. In severe cases, breathlessness with frothy sputum (pulmonary oedema) can occur. Bronchitis can develop 24 to 48 hours after exposure. There may also be confusion, loss of consciousness and, rarely, convulsions.</p> <p><i>Ingestion</i></p> <p>There will be nausea and vomiting. In severe cases, there may be blood in the vomit. Mental confusion, unconsciousness and convulsions may occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>Emergency treatment: see 8. 2.</p> <p>Corneal oedema: this should improve within 4 hours if the casualty is removed from exposure. If there is no improvement, RADIO FOR MEDICAL ADVICE.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>Pulmonary oedema: see 6. 1. 2.</p> <p>Bronchitis: see 6. 1. 3.</p> <p>Convulsions: see 6. 3. 2.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p> <p>Bleeding: see 6. 4. 3.</p> <p>Convulsions: see 6. 3. 2.</p>

Table 321

DIMETHYLFORMAMIDE

General information

This chemical is an irritant, but may be severely toxic to the liver in high concentration.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be irritation and redness. It may be absorbed through the intact skin, causing liver damage.</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation.</p> <p><i>Inhalation</i></p> <p>There may be mild shortness of breath with flushing of the face.</p> <p>In severe cases, liver failure can occur as a late complication after 2 or 3 days.</p> <p><i>Ingestion</i></p> <p>This is unlikely to occur, but there may be nausea and vomiting. Liver failure can occur in severe cases.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8.1. Liver failure: see 6.4.5.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8.2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8.3. Liver failure: see 6.4.5.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8.4. Liver failure: see 6.4.5.</p>

Table 322

MORPHOLINE

General information

This chemical is a severe irritant of the skin and lungs. The casualty should be observed for at least 72 hours after exposure, since there may be a delayed onset of symptoms.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There will be severe irritation and redness. Chemical burns can occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p>
<p><i>Eye contact</i></p> <p>There may be redness and irritation, followed by blurring of vision. This is due to swelling of the linings of the eye (corneal oedema). Chemical burns can occur.</p>	<p><i>Eye contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>Emergency treatment: see 8. 2.</p> <p>Corneal oedema: this should improve spontaneously within 4 hours if the casualty is removed from exposure. If there is no improvement, RADIO FOR MEDICAL ADVICE.</p>
<p><i>Inhalation</i></p> <p>There may be burning of the mouth and throat, with shortness of breath. In severe cases this may be associated with frothy sputum (pulmonary oedema), which can develop at any time up to 72 hours after exposure.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>Pulmonary oedema: see 6. 1. 2.</p>
<p><i>Ingestion</i></p> <p>There may be severe nausea and vomiting with burns of the mouth and throat. Liver and kidney failure may occur.</p>	<p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p> <p>Liver failure: see 6. 4. 5.</p> <p>Kidney failure: see 6. 5. 1</p>

Table 323

ACRYLAMIDE

General information

This chemical is toxic to the nervous system. The signs and symptoms as described below may develop slowly over a few days after exposure. The patient should be transferred ashore for further care, since he can take some time to improve.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation. It is absorbed through the intact skin, producing signs similar to those of inhalation (see below).</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation.</p> <p><i>Inhalation</i></p> <p>In mild cases, there will be nausea, drowsiness and lethargy. In more severe cases, there may be weakness of the arms and legs, with tingling in the extremities. There may be difficulty in walking. Hallucinations may occur. In some cases, a particular feature is increased sweating, and loss of the skin of the palms of the hands.</p> <p><i>Ingestion</i></p> <p>There may be nausea and vomiting. Symptoms similar to those of inhalation can occur (see above).</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p>

Table 325

PYRIDINES

General information

These chemicals are toxic to the nervous system, the liver and the kidneys.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>Mild irritation may occur. They are absorbed through the intact skin, producing symptoms similar to those of inhalation (see below).</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation.</p> <p><i>Inhalation</i></p> <p>There may be nausea, headache, giddiness, anxiety and vomiting. Drowsiness and unconsciousness can develop in some cases.</p> <p><i>Ingestion</i></p> <p>This produces signs similar to those of inhalation (see above). In severe cases, liver failure and kidney failure may occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Liver failure: see 6. 4. 5. Kidney failure: see 6. 5. 1.</p>

Table 330

ALIPHATIC AND AROMATIC ESTERS AND ETHERS

General information

These chemicals vary in their severity of toxic effects. They are mainly irritants, but also cause depression of the nervous system.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation with blisters.</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation.</p> <p><i>Inhalation</i></p> <p>In mild cases, there will be a cough, irritation of the mouth and throat, occasionally with chest pain. In more severe cases, there may be confusion, drowsiness and loss of consciousness. Convulsions can occur. Shortness of breath with frothy sputum (pulmonary oedema) is a rare complication. Bronchitis may develop after 1 to 2 days.</p> <p><i>Ingestion</i></p> <p>This is unlikely to occur, but can cause nausea and vomiting with abdominal pain. Mental confusion and unconsciousness may occur. Kidney failure is a rare complication.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8.3. Pulmonary oedema: see 6.1.2. Convulsions: see 6. 3. 2. Bronchitis: see 6. 1. 3.</p> <p>Mental confusion: see 6. 3. 3.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Kidney failure: see 6. 5. 1.</p> <p>Mental confusion: see 6. 3. 3.</p>

Table 331

CAMPHOR OIL

General information

This is a highly toxic compound if ingested. Small quantities have been reported to cause symptoms. It is not particularly toxic to the skin or eyes.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>Irritation and redness may occur with high concentrations.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p>
<p><i>Eye contact</i></p> <p>Mild irritation and redness may occur.</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>There may be sneezing, watering of the eyes and a cough on mild exposure. More severe exposure can result in confusion, headaches, twitching of the muscles, unconsciousness and convulsions.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8.3. Convulsions: see 6.3.2. Mental confusion: see 6. 3. 3.</p>
<p><i>Ingestion</i></p> <p>There may be nausea and vomiting with confusion and drowsiness. Severe cases will have a rapid onset of unconsciousness and convulsions.</p>	<p><i>Ingestion</i></p> <p>Emergency treatment: see 8.4. Convulsions: see 6.3.2. Mental confusion: see 6. 3. 3.</p> <p>Give two sachets (10 g) of activated charcoal dispersed in 500 ml (1 pint) of water, followed by three doses of one sachet (5 g) in 100 ml of water at intervals of 20 minutes.</p> <p>RADIO FOR MEDICAL ADVICE.</p>

Table 335

AMINO AND NITRO COMPOUNDS OF THE AROMATIC SERIES

General information

These chemicals are toxic to the blood cells. Aniline and nitrobenzene are particularly toxic.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation. They are absorbed through the intact skin, causing symptoms similar to those of inhalation and ingestion (see below).</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation.</p> <p><i>Inhalation and ingestion</i></p> <p>There will be nausea, vomiting, pain in the chest, and weakness. There may be blueness of the ear lobes and lips, with shortness of breath. In severe cases, there will be deep blueness of the lips, gums, tongue or face caused by damage to the blood cells (methaemoglobinaemia). This causes asphyxia. There may be drowsiness, loss of consciousness and, rarely, convulsions. Liver failure can occur 2 to 3 days after exposure.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation and ingestion</i></p> <p>Emergency treatment: see 8. 3 and 8. 4.</p> <p>Convulsions: see 6. 3. 2.</p> <p>Liver failure: see 6. 4. 5.</p> <p>Asphyxia: see 6. 1. 1.</p> <p>Methaemoglobinaemia</p> <p>If symptoms occur as described and the patient is conscious, give 20 ml of methylene blue 1 % by mouth. Also give 1 g of ascorbic acid by mouth, and repeat every 4 hours for 24 hours.</p> <p>If the patient is unconscious, give 5 ml of 10% ascorbic acid intramuscularly.</p>

Table 340

CHLORINATED HYDROCARBONS

General information

These chemicals vary in their degree of toxicity. They may be irritant to the skin and lungs.

They are also absorbed into the body, causing depression of the nervous system, and some may cause damage to the liver.

Prolonged exposure to these chemicals may cause long-term effects. They may produce highly toxic fumes of **phosgene** (Table 600) if they are involved in a fire. The following chemicals are extremely toxic and may cause death: methyl chloride, allyl chloride, chloroform, ethylene dichloride, carbon tetrachloride, pentachloroethane and tetrachloroethane.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation. Chemical burns can occur with some of these chemicals. They can be absorbed through the intact skin, causing symptoms similar to those of inhalation (see below).</p> <p><i>Eye contact</i></p> <p>There may be redness and severe irritation.</p> <p><i>Inhalation</i></p> <p>In mild cases there may be a cough, sneezing and slight breathlessness. In more severe cases, this may be followed by drowsiness, headache, nausea, vomiting and diarrhoea. Severe shortness of breath with frothy sputum (pulmonary oedema) can occur. The patient may become drowsy, unconscious and occasionally develop convulsions. Liver failure and kidney failure may occur after 2 or 3 days.</p> <p><i>Ingestion</i></p> <p>There may be nausea, vomiting, abdominal pain and headache. Drowsiness and unconsciousness may develop; convulsions can occur. Liver and kidney failure may occur 2 or 3 days after exposure.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2.</p> <p>Convulsions: see 6. 3. 2.</p> <p>Liver failure: see 6. 4. 5. Kidney failure: see 6. 5. 1.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p> <p>Convulsions: see 6. 3. 2. Liver failure: see 6. 4. 5. Kidney failure: see 6. 5. 1.</p>

Table 345**BROMINATED, IODINATED AND FLUORINATED HYDROCARBONS****General information**

These chemicals vary in their degree of toxicity. They act on the nervous system, and are irritants of the skin and lungs. They may cause damage to the liver.

The following chemicals are extremely toxic, and may cause death: methyl bromide, methyl bromide mixtures, chloropicrin and methyl bromide mixtures, allyl iodide, ethylene dibromide, bromoform, tetrabromoethane, methyl iodide and carbon tetrabromide.

Note: The symptoms may be delayed in onset from 30 minutes to three days after exposure.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation.</p> <p>They are absorbed through the intact skin, causing symptoms similar to those of inhalation and of ingestion (see below).</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation.</p> <p><i>Inhalation</i></p> <p>In low concentrations, mild shortness of breath with a cough may occur. In high concentrations, there may be severe breathlessness with frothy sputum (pulmonary oedema). Many of these chemicals are absorbed through the lungs, producing drowsiness and an unsteady walk. In severe cases, there may be muscle twitching, trembling of the tongue and fingers, slurred speech, misty vision and dilated pupils. Unconsciousness may follow and occasionally convulsions. Liver and kidney failure can also occur.</p> <p><i>Ingestion</i></p> <p>There may be nausea and vomiting, and signs similar to those of inhalation may occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>Pulmonary oedema: see 6. 1. 2.</p> <p>Convulsions: see 6. 3. 2.</p> <p>Liver failure: see 6. 4. 5.</p> <p>Kidney failure: see 6. 5. 1.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p>

Table 350

FLUORINATED HYDROCARBONS - REFRIGERANTS

General information

These chemicals are dangerous because they displace oxygen, causing asphyxia. They also cause unconsciousness in high concentrations.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be pain and redness. If there is a persistent white area, frost-bite has occurred.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1. Frost-bite: see 6. 8.</p>
<p><i>Eye contact</i></p> <p>There may be mild irritation and occasionally redness.</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>In low concentrations, there may be mild shortness of breath and a cough. High concentrations cause a headache, nausea, drowsiness and unconsciousness.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p>
<p><i>Ingestion</i></p> <p>This is unlikely to occur. Nausea and vomiting with frost-bite of the mouth and throat might be expected.</p>	<p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. If frost-bite of the throat is suspected, give warm drinks.</p> <p>RADIO FOR MEDICAL ADVICE.</p>

Table 355

TRICRESYL PHOSPHATE

General information

This chemical is toxic to the nervous system. It is unusual because the development of symptoms described below may not appear for up to 28 days after exposure. Personnel who have been exposed must be transferred ashore for medical advice. In addition, they should not return to sea until they have been given clearance to do so by a doctor who has been adequately informed of the circumstances of the accident.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be mild irritation. It is absorbed through the intact skin, producing symptoms similar to those of inhalation and ingestion (see below).</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation.</p> <p><i>Inhalation and ingestion</i></p> <p>At first, there may be nausea, vomiting and diarrhoea, which usually subsides after 2 or 3 days. After apparent recovery, there may be a delay of up to one month, after which, sharp "cramp-like" pains and "pins and needles" in the arms and legs may occur. This may be followed by numbness of the same areas. In severe cases, weakness of the muscles occurs with difficulty in breathing.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation and ingestion</i></p> <p>Emergency treatment: see 8. 3 and 8. 4.</p>

Table 360

ALIPHATIC SILICATES

General information

These chemicals are severe irritants in high concentrations. They may also cause damage to the kidneys and liver.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be irritation and redness.</p> <p><i>Eye contact</i></p> <p>There may be severe irritation and redness.</p> <p><i>Inhalation</i></p> <p>Mild exposure may only produce irritation of the mouth and throat. In more severe cases, there is shortness of breath, drowsiness and trembling of the hands. Severe breathlessness with frothy sputum (pulmonary oedema) may occur. Liver and kidney failure may occur as late complications.</p> <p><i>Ingestion</i></p> <p>There may be nausea and vomiting. In severe cases, drowsiness and mental confusion can occur. Liver and kidney failure may occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8.3. Pulmonary oedema: see 6. 1. 2. Liver failure: see 6.4.5. Kidney failure: see 6. 5. 1.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Liver failure: see 6. 4. 5. Kidney failure: see 6.5.1.</p> <p>Mental confusion: see 6. 3. 3.</p>

Table 365

ALIPHATIC OXIDES

General information

These chemical substances are toxic to the nervous system, liver and kidneys. They are also severe irritants of the skin and lungs. The main hazard is from inhalation since they are liquids only at low temperatures.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There will be redness and severe irritation. Chemical burns may occur with blistering. Frost-bite may occur.</p> <p><i>Eye contact</i></p> <p>There will be severe redness and irritation.</p> <p><i>Inhalation</i></p> <p>Immediate effects are usually a sore throat, a peculiar taste in the mouth with nausea and mild shortness of breath. In severe cases there may be a delayed onset of nausea, vomiting, shortness of breath with frothy sputum (pulmonary oedema), drowsiness, muscular weakness and unconsciousness. These can occur up to 3 days after exposure. Liver and kidney damage may follow; death can occur.</p> <p><i>Ingestion</i></p> <p>This is unlikely to occur but if it does there may be severe nausea and vomiting with unconsciousness.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p>Frost-bite: see 6. 8.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>Pulmonary oedema: see 6. 1. 2.</p> <p>Liver failure: see 6. 4. 5.</p> <p>Kidney failure: see 6. 5. 1.</p> <p>RADIO FOR MEDICAL ADVICE.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p>

Table 370

ISOCYANATES

General information

These chemicals are strong irritants of the skin and lungs. They are not severely toxic, but may produce symptoms similar to **asthma*** if inhaled.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation.</p> <p><i>Eye contact</i></p> <p>There will be redness and irritation, which can be severe.</p> <p><i>Inhalation</i></p> <p>In low concentrations, there may be sneezing, mild shortness of breath and a cough. In more severe cases, there is often an interval of a few hours before the onset of shortness of breath, wheezing and, in rare cases, breathlessness with frothy sputum (pulmonary oedema). In a few cases, these symptoms may occur immediately. Bronchitis may occur.</p> <p><i>Ingestion</i></p> <p>There will be nausea and vomiting with mild abdominal pain. No other severe symptoms usually occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Bronchitis: see 6. 1. 3.</p> <p>Wheezing - If wheezing, administer oxygen and give two puffs of salbutamol (100 micrograms per puff) and five puffs of beclomethasone (50 micrograms per puff) every 15 minutes by spacer device for the first hour. At the same time SEEK MEDICAL ADVICE. Hospital treatment may be required. If wheezing continues after the first hour, continue with oxygen and give two puffs of salbutamol and five puffs of beclomethasone by spacer device every two hours for the next 12 hours, while awaiting medical advice. Then give two puffs four times a day of both salbutamol and beclomethasone if symptoms persist. RADIO FOR MEDICAL ADVICE.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p>

* Asthma is a condition characterized by a sudden onset of shortness of breath and wheezing which responds within 5 minutes to treatment with a salbutamol inhaler.

Table 375

MERCAPTANS

General information

These chemicals are toxic to the nervous system. They are irritants of the mouth, throat and lungs. They have a strong unpleasant odour.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p>
<p><i>Eye contact</i></p> <p>There will be redness and irritation, with profuse watering of the eyes.</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>At low concentrations, there is often a cough, mild shortness of breath, and irritation of the mouth and throat. There may be dizziness and mental confusion. Bronchitis may occur after 24 to 36 hours.</p> <p>In more severe cases, with higher concentrations, breathlessness with frothy sputum (pulmonary oedema) can occur. The patient will become unconscious, and breathing may stop. Convulsions may be a complication.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>Bronchitis: see 6. 1. 3.</p> <p>Pulmonary oedema: see 6. 1. 2.</p> <p>Convulsions: see 6. 3. 2.</p> <p>Mental confusion: see 6. 3. 3.</p>
<p><i>Ingestion</i></p> <p>This is unlikely to occur, but if it does will produce nausea and vomiting, followed by unconsciousness if sufficient has been ingested. Convulsions may occur.</p>	<p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p> <p>Convulsions: see 6. 3. 2.</p>

Table 376

PERCHLOROMETHYL MERCAPTAN

General information

This chemical is an extremely toxic liquid, which readily gives off fumes and has a strong unpleasant odour. It is a severe irritant of the lungs when inhaled and may be absorbed, causing damage to the liver and kidneys. Death may occur.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness, irritation and blisters. Chemical burns can occur.</p> <p><i>Eye contact</i></p> <p>There will be severe redness and irritation, with profuse watering of the eyes.</p> <p><i>Inhalation</i></p> <p>Low concentrations will produce irritation of the mouth and throat, with a feeling of weakness, muscle pains, a slight temperature, mild shortness of breath and a cough.</p> <p>High concentrations will result in severe breathlessness, often with frothy sputum (pulmonary oedema), painful breathing with a cough, vomiting and a rapid pulse. Liver failure and kidney failure may occur as late complications.</p> <p><i>Ingestion</i></p> <p>There will be nausea and vomiting with abdominal pain. Liver failure and kidney failure can occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Liver failure: see 6. 4. 5. Kidney failure: see 6. 5. 1</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Liver failure: see 6. 4. 5. Kidney failure: see 6. 5. 1.</p>

Table 500

ORGANOCHLORINE PESTICIDES

General information

These chemicals may vary in their degree of toxicity; a few of them are extremely dangerous, particularly after ingestion. They act on the nervous system and may cause death.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be mild irritation. They are absorbed through the intact skin, causing signs similar to those of inhalation and ingestion (see below).</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation.</p> <p><i>Inhalation and ingestion</i></p> <p>There may be a delay of up to 10 hours before symptoms develop. In many cases, this may be the sudden onset of convulsions followed by a period of unconsciousness. These may be frequent and result in death. The majority of cases, however, recover, but may have dizziness, general muscular weakness and lethargy for some weeks afterwards. Other symptoms that occur initially are nausea, vomiting, headache, muscle twitching, disturbance of vision and abdominal pain. Liver damage may occur rarely.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation and ingestion</i></p> <p>Emergency treatment: see 8. 3 and 8. 4. Convulsions: see 6. 3. 2.</p> <p>If the patient has ingested the chemical and is still conscious, give two sachets (10 g) of activated charcoal in 500 ml (1 pint) of water immediately. Follow with three doses of one sachet (5 g) in 100 ml of water at 20 minute intervals.</p> <p>Liver failure: see 6. 4. 5.</p>

Table 505**ORGANOPHOSPHORUS AND CARBAMATE PESTICIDES****General information**

These chemicals are extremely toxic to the nervous system. They block the mechanism which stimulates muscles and may also damage the brain. Death may occur.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be mild redness and irritation. Absorption through the intact skin can cause symptoms and signs similar to those of inhalation and ingestion (see below).</p> <p><i>Eye contact</i></p> <p>There may be mild redness and irritation.</p> <p><i>Inhalation and ingestion</i></p> <p>The first symptoms are usually loss of appetite, headache, exhaustion, weakness and confusion. These effects may be experienced during exposure or up to 12 hours later. Vomiting, cramp-like abdominal pains, excessive cold sweating and salivation may follow. The pupils of the eyes are small and tightness in the chest with difficulty in breathing may be experienced. The pulse rate may become slow (30 to 40 per minute). There may be twitching of the muscles, particularly of the face and tongue. In severe cases, convulsions and unconsciousness can occur. Death may follow.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2</p> <p><i>Inhalation and ingestion</i></p> <p>Emergency treatment: see 8. 3 and 8. 4. Convulsions: see 6. 3. 2. Mental confusion: see 6. 3. 3.</p> <p>If symptoms as described develop, give atropine sulphate 1 mg intramuscularly every 15 minutes until the mouth becomes dry and one or more of the following occur:</p> <ul style="list-style-type: none"> - the pupils become large - the pulse becomes normal (70 to 80 per minute) - the convulsions stop - the breathing improves. <p>DO NOT GIVE MORE THAN 10 INJECTIONS IN TOTAL, each of 1 mg, without further radio medical advice.</p>

Table 506

DITHIOCARBAMATES

General information

These chemicals are toxic to the nervous system. If exposure has occurred, **do NOT** give alcohol since this may increase the toxic effects.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>Mild irritation may occur. They can be absorbed through the intact skin, causing similar symptoms to those of inhalation and ingestion (see below).</p> <p><i>Eye contact</i></p> <p>There may be mild redness and irritation.</p> <p><i>Inhalation and ingestion</i></p> <p>In low concentrations, there will be a headache with drowsiness. In more severe cases, confusion, mental agitation, unconsciousness and, rarely, convulsions may develop. In a few cases, there may be a skin rash and blurring of vision. Weakness of the arms and legs with numbness may occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation and ingestion</i></p> <p>Emergency treatment: see 8. 3 and 8. 4. Convulsions: see 6. 3. 2.</p> <p>Mental confusion: see 6. 3. 3. RADIO FOR MEDICAL ADVICE.</p>

Table 510

PHENOXYL PESTICIDES

General information

These chemicals are toxic to the nervous system. In high concentrations, they may also damage the liver and kidneys. The most serious effects occur after ingestion.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be mild irritation and redness.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8.1.</p>
<p><i>Eye contact</i></p> <p>There may be mild irritation and redness.</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8.2.</p>
<p><i>Inhalation and ingestion</i></p> <p>There may be an increase in salivation, abdominal pain, nausea, vomiting and diarrhoea. In more severe cases, there will be drowsiness, slurred speech, jerking of the muscles, mental confusion and progressive unconsciousness. Convulsions can occur.</p>	<p><i>Inhalation and ingestion</i></p> <p>Emergency treatment: see 8.3 and 8.4. Convulsions: see 6. 3. 2.</p> <p>Mental confusion: see 6. 3. 3.</p>

Table 515

NITROPHENOL PESTICIDES

General information

These are an extremely toxic group of chemicals. They have a general action on the whole body. Death may occur.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and pain. They are absorbed through the intact skin, causing toxic symptoms similar to those of inhalation and ingestion (see below).</p> <p><i>Eye contact</i></p> <p>There may be redness, irritation and pain.</p> <p><i>Inhalation and ingestion</i></p> <p>The patient may be well at first, but then develops restlessness, anxiety, flushed skin, rapid breathing and nausea.</p> <p>The patient may have a high temperature and a rapid pulse, with profuse sweating. In severe cases, there is often profound weakness, blue discoloration of the skin and progressive unconsciousness. Liver failure can occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation and ingestion</i></p> <p>Emergency treatment: see 8. 3 and 8. 4. High temperature: see 6. 6.</p> <p>Liver failure: see 6. 4. 5.</p> <p>Note: If the patient has a high temperature of over 40°C, efforts should be made to lower it by use of a fan, cold sponging and ice packs. If he is conscious, give frequent cold drinks.</p> <p>Do NOT give alcohol.</p>

Table 520

PHENYL UREA PESTICIDES

General information

These chemicals are irritants to the skin and lungs.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be severe redness, irritation and occasionally pain.</p> <p><i>Eye contact</i></p> <p>There may be severe redness and pain.</p> <p><i>Inhalation and ingestion</i></p> <p>There may be vomiting, diarrhoea, shortness of breath and blueness of the skin. In severe cases, particularly following inhalation, breathlessness with frothy sputum (pulmonary oedema) may develop. If shortness of breath persists over several days, it is possible that fluid has accumulated around the outside of the lungs. This is called a pleural effusion. Liver failure may also occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation and ingestion</i></p> <p>Emergency treatment: see 8. 3 and 8. 4.</p> <p>Pulmonary oedema: see 6. 1. 2.</p> <p>Pleural effusion: see 6. 1. 5.</p> <p>If pleural effusion is suspected, RADIO FOR MEDICAL ADVICE.</p> <p>Liver failure: see 6. 4. 5.</p>

Table 525

BIPYRIDILIUM PESTICIDES

General information

These chemicals, particularly Paraquat, are extremely toxic if ingested. The onset of symptoms may be delayed, and prolonged over a few days. They are moderately severe irritants to the skin and lungs. They are absorbed through the intact skin, but they do not cause the severe toxicity that follows ingestion. If ingestion has occurred, the patient should be transferred ashore as soon as possible.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be severe irritation, pain, redness and blistering. Absorption through the intact skin can occur, causing nausea and vomiting.</p>	<p><i>Skin contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>Emergency treatment: see 8. 1.</p> <p>Persistent vomiting: see 6. 4. 2.</p>
<p><i>Eye contact</i></p> <p>There may be severe irritation and pain with redness. Chemical burns can occur.</p>	<p><i>Eye contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>There will be shortness of breath with a cough and soreness of the throat. In severe cases, breathlessness with frothy sputum (pulmonary oedema) may occur.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>Pulmonary oedema: see 6. 1. 2.</p>
<p><i>Ingestion</i></p> <p>There will be soreness of the mouth and throat, and difficulty in swallowing. Vomiting, diarrhoea and abdominal pain may follow. Liver failure and kidney failure may develop after 2 or 3 days. In severe cases, shortness of breath occurs after 5 to 10 days, which progresses to asphyxia, unconsciousness and death.</p>	<p><i>Ingestion</i></p> <p>Give two sachets (10 g) of activated charcoal in 500 ml (1 pint) of water immediately. Follow with three doses of one sachet (5 g) in 100 ml of water at intervals of 20 minutes.</p> <p>Emergency treatment: see 8. 4.</p> <p>Asphyxia: see 6. 1. 1.</p> <p>Kidney failure: see 6. 5. 1.</p> <p>Liver failure: see 6. 4. 5.</p>

Table 530

MISCELLANEOUS PESTICIDES TRIAZINE
PESTICIDES BENZOIC DERIVATIVE
PESTICIDES PHTHALIMIDE PESTICIDES

General information

This group of pesticides are of low toxicity, and have not been reported to cause any serious symptoms.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>No symptoms are likely to occur.</p> <p><i>Eye contact</i></p> <p>No symptoms are likely to occur.</p> <p><i>Inhalation</i></p> <p>No symptoms are likely to occur.</p> <p><i>Ingestion</i></p> <p>Mild drowsiness may occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p> <p>The patient should rest quietly for 24 hours and be observed for any abnormal symptoms.</p> <p>RADIO FOR MEDICAL ADVICE should any symptoms occur.</p>

Table 535

RODENTICIDES

General information

There are many rodenticides, some of which contain heavy metals. These must be declared prior to carriage in order to identify the composition. Some of these compounds are composed of, or contain, Warfarin, which is a drug that causes bleeding. It is toxic only when ingested in large quantities.

Signs and symptoms	Treatment
<p><i>Ingestion</i></p> <p>There may be a burning sensation of the skin, nose bleeds and vomiting of blood rarely. The first sign may be blood passed in the urine or the faeces.</p>	<p><i>Ingestion</i></p> <p>If these signs occur, give Vitamin K₁ 10 mg intramuscularly. If further bleeding occurs in the following 24 hours, give another dose of Vitamin K₁ 10 mg intramuscularly and RADIO FOR MEDICAL ADVICE.</p> <p>Internal bleeding: see 6. 4. 3.</p>

Table 540

FLUOROACETATES AND CHLOROACETATES

General information

These chemicals are highly toxic and have a general action on the whole body. They particularly affect the nervous system and heart. Death can occur.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation. Absorption through the intact skin can occur, producing symptoms similar to those of ingestion (see below).</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation.</p> <p><i>Inhalation</i></p> <p>In low concentrations, there will be mild shortness of breath only. In severe cases, this may be worse, and can be associated with frothy sputum (pulmonary oedema). Other symptoms may occur similar to those of ingestion (see below).</p> <p><i>Ingestion</i></p> <p>There may be a delay of 30 minutes to 2 hours before symptoms develop. These include nausea, vomiting, anxiety, muscle twitching, confusion and unconsciousness. Convulsions can occur. The pulse may become rapid and irregular, and circulatory collapse can occur. Breathlessness with frothy sputum (pulmonary oedema) may develop suddenly. Kidney failure may occur as a late complication.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Convulsions: see 6. 3. 2. Circulatory collapse: see 6. 2. 1. Pulmonary oedema: see 6. 1. 2. Kidney failure: see 6. 5. 1. Mental confusion: see 6. 3. 3.</p>

Table 545

ORGANOTIN PESTICIDES

General information

These chemicals vary in their degree of toxicity. Some are toxic to the nervous system, whereas others are only irritants.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation.</p> <p><i>Eye contact</i></p> <p><i>Inhalation and ingestion</i></p> <p>There may be mild shortness of breath with a cough and sore throat. Nausea and vomiting can occur.</p> <p>In severe cases the onset of symptoms may be delayed for 2 to 4 days. There may be weakness, an irregular pulse, difficulty in breathing, convulsions, and unconsciousness. Death may occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation and ingestion</i></p> <p>Emergency treatment: see 8. 3 and 8. 4.</p> <p>Convulsions: see 6. 3. 2.</p> <p>RADIO FOR MEDICAL ADVICE.</p>

Table 550

FUMIGANTS

General information

Fumigation of cargoes or cargo spaces must be carried out only by qualified operators.*

The main fumigants used are:	
1 Methyl bromide	Table 345
2 Hydrogen cyanide	Table 645
3 Hydrogen phosphide	Table 601
4 Methyl bromide and carbon dioxide	Tables 345 and 615
5 Carbon dioxide and nitrogen	Table 615

*Refer to IMO publication *Recommendations on the Safe Use of Pesticides in Ships*.

Table 600

PHOSGENE

General information

This is a highly toxic gas, which acts mainly on the lungs. There may be no warning odour of its presence; however, there may be a smell of rotting hay. There may be an interval of several hours after exposure before the onset of symptoms. It may be formed from many of the chlorinated hydrocarbons (Table 340) in a fire.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be severe irritation and redness. Painful burns can occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p>
<p><i>Eye contact</i></p> <p>There may be severe irritation and redness. Chemical burns can occur</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>Immediately after exposure, there is usually a dryness in the throat, vomiting and shortness of breath. These may improve after a few hours. In more severe cases there will initially be severe irritation of the throat and mouth. A period of up to 48 hours may pass before the onset of further symptoms. At first there will be a headache, weakness and a painful cough. This is followed by severe shortness of breath with frothy sputum (pulmonary oedema) and blueness of the skin. Loss of consciousness and death may follow.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>Pulmonary oedema: see 6. 1. 2.</p>

Table 601

PHOSPHINE

General information

This is a highly toxic gas. It has a general action on the whole body. It has a garlic-like odour.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p>
<p><i>Eye contact</i></p> <p>There may be redness and irritation</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>At low concentrations, there may be nausea, vomiting, diarrhoea, chest tightness and headache. Difficulty in breathing and drowsiness may occur. In severe cases, these symptoms occur, but are followed by severe difficulty in breathing with frothy sputum (pulmonary oedema) unconsciousness and, on rare occasions, convulsions.</p> <p>Note: The onset of pulmonary oedema may be delayed for up to 72 hours.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Convulsions: see 6. 3. 2.</p>

Table 605

ARSINE

General information

This is an extremely toxic gas, which causes severe damage to the blood and kidneys. It does not have any odour to act as a warning of its presence. It is released when acid or water comes into contact with arsenic or ferrosilicon compounds. The patient should be transported ashore as soon as possible.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be mild irritation.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p>
<p><i>Eye contact</i></p> <p>There may be mild irritation and redness.</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>There is usually a delay of 2 to 24 hours after exposure before the onset of symptoms. The patient may have a garlic odour on the breath after exposure. There may be nausea, vomiting, dizziness, weakness and headache. Abdominal pain and diarrhoea may develop. In severe cases, the first sign is often red urine which develops after 4 to 6 hours, becoming brown later. The blood cells are damaged and the skin becomes yellow (jaundice) over a period of 24 to 48 hours. Kidney failure may then occur. Liver failure is a rare complication. There may be severe shortness of breath with frothy sputum (pulmonary oedema). The patient can become mentally agitated. He may also develop weakness and numbness in the arms and legs a few days after exposure.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>The patient should be transferred ashore as soon as possible.</p> <p>Pulmonary oedema: see 6. 1. 2.</p> <p>Kidney failure: see 6. 5. 1.</p> <p>Liver failure: see 6. 4. 5.</p> <p>Mental agitation: see 6. 3. 3.</p>

Table 606

STIBINE, GERMANE

General information

These are highly toxic gases, which cause severe damage to the blood and kidneys. Stibine is released by the action of water or acid on antimony or ferrosilicon compounds. Germane is a similar gas in its action. If severe symptoms occur, the patient should be transferred ashore as soon as possible. At low concentrations there is no warning smell of their presence.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation.</p> <p><i>Inhalation</i></p> <p>At low concentrations, there will be a cough with shortness of breath. Symptoms may not occur until 3 to 24 hours after exposure. There may be a garlic odour on the breath. At first, nausea, dizziness, vomiting and weakness occur. In severe cases, breathlessness with frothy sputum ashore (pulmonary oedema) may follow. Damage of the blood cells can develop, giving the skin a yellow colour and turning the urine dark brown. Kidney and liver failure can occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>Pulmonary oedema: see 6. 1. 2.</p> <p>Kidney failure: see 6. 5. 1.</p> <p>Liver failure: see 6. 4. 5.</p> <p>The patient should be transferred</p>

Table 610

NITROGEN OXIDES

General information

These gases are highly toxic to the lungs. Some of them also have an irritant action. At low concentrations there is no warning of their presence, but in higher concentrations there may be a pungent odour. Compounds are included in this table which are capable of producing oxides of nitrogen.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation.</p> <p><i>Inhalation</i></p> <p>At low concentrations, there may be chest pain with shortness of breath and a cough. Bronchitis can occur. More severe exposure may result in dangerous symptoms, which can occur in two stages; first there may only be increasing shortness of breath with a cough, that improves over a period of up to 3 weeks. The patient may then develop a severe relapse, with fever, breathlessness with frothy sputum (pulmonary oedema) and blueness of the skin.</p> <p>However, pulmonary oedema may occur at any time up to 3 weeks after exposure without any previous symptoms.</p> <p>In very severe cases, pulmonary oedema can occur within a few hours after exposure.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>Pulmonary oedema: see 6. 1. 2.</p> <p>Bronchitis: see 6. 1. 3.</p> <p>The patient should be transferred ashore for observation. He should not return to sea within 3 weeks after exposure, and medical clearance should be obtained.</p> <p>RADIO FOR MEDICAL ADVICE.</p>

Table 615

CARBON DIOXIDE

General information

This gas is dangerous because it displaces air and causes asphyxia. It is produced in large quantities by fires. It has no warning smell of its presence. Carbon dioxide may be transported in liquid or solid forms at very low temperature and is used as "Dry Ice".

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>The gas is not toxic to the skin. The solid and liquid forms may produce frost-bite if they come into contact with the skin.</p> <p><i>Eye contact</i></p> <p>The gas does not produce any symptoms.</p> <p><i>Inhalation</i></p> <p>There may be increased deep breathing, a rapid pulse, headache, agitation, drowsiness and weakness. Higher concentrations will produce unconsciousness, and convulsions may occur. The lips, hands and skin may be blue.</p>	<p><i>Skin contact</i></p> <p>Frost-bite: see 6. 8.</p> <p><i>Eye contact</i></p> <p>None.</p> <p><i>Inhalation</i></p> <p>IMMEDIATELY REMOVE FROM EXPOSURE.</p> <p>Give oxygen: see 8. 3. 1.</p> <p>Emergency treatment: see 8. 3.</p> <p>Convulsions: see 6. 3. 2.</p>

Table 616

CARBON MONOXIDE

General information

This gas is highly toxic because it replaces oxygen in the blood. In severe cases, the patient should be transferred ashore, since damage of the nervous system may develop up to 2 weeks after exposure.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin and eye contact</i></p> <p>This gas is not toxic to either the skin or the eyes.</p> <p><i>Inhalation</i></p> <p>Low concentrations may produce drowsiness, mental confusion, nausea, dizziness and vomiting. The skin may be extremely pink, but in severe cases it can often be grey. High concentrations result in rapid loss of consciousness. There is rapid breathing which may stop suddenly. The pulse may be weak or absent. Convulsions can occur. Delayed symptoms can occur after a period of up to 2 weeks. These include confusion, loss of feeling in the fingers and toes, weakness and, rarely, convulsions.</p>	<p><i>Skin and eye contact</i></p> <p>None.</p> <p><i>Inhalation</i></p> <p>IMMEDIATELY REMOVE FROM EXPOSURE.</p> <p>Give oxygen: see 8. 3. 1.</p> <p>Emergency treatment: see 8. 3.</p> <p>Convulsions: see 6. 3. 2.</p> <p>The patient should be transferred ashore for observation. He should not return to sea within 3 weeks after exposure, and medical clearance should be obtained.</p>

Table 620

LIQUEFIED GASES

General information

These gases are essentially non-toxic. They are usually transported in liquefied form at very low temperatures.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>Severe frost-bite may occur if the liquid is in contact with the skin.</p> <p><i>Eye contact</i></p> <p>Unlikely to occur, but frost-bite may damage the surface of the eye.</p> <p><i>Inhalation</i></p> <p>At normal temperatures, these chemicals are gases which can displace air in a confined space. This will produce drowsiness and unconsciousness if sufficient gas is inhaled. If there is severe lack of oxygen, death may occur.</p>	<p><i>Skin contact</i></p> <p>Frost-bite: see 6. 8.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2. Frost-bite: see 6. 8.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Give oxygen: see 8. 3. 1.</p>

Table 630

TELLURIUM HEXAFLUORIDE

General information

Tellurium hexafluoride is a severe irritant and is highly toxic

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation.</p> <p><i>Eye contact</i></p> <p>There may be severe irritation and redness.</p> <p><i>Inhalation</i></p> <p>Mild exposure may result in headache, nausea and shortness of breath. The patient may have a dry mouth and a metallic taste is noticed. In severe cases, there may be a garlic-like odour of the breath, profuse sweating and severe breathlessness with frothy sputum (pulmonary oedema). The onset of symptoms may be delayed for up to 72 hours. Kidney and liver failure may rarely occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Kidney failure: see 6. 5. 1. Liver failure: see 6. 4. 5.</p>

Table 635

SULPHUR DIOXIDE

General information

This is a colourless gas with a strong pungent odour. It is extremely irritant in high concentrations and is particularly corrosive to the mouth, throat and lungs.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be severe redness and irritation. Chemical burns may occur.</p> <p><i>Eye contact</i></p> <p>There may be severe irritation, redness and watering of the eyes. Chemical burns may occur.</p> <p><i>Inhalation</i></p> <p>In low or moderate concentrations, there may be irritation of the nose and throat with shortness of breath, a cough and tightness of the chest. There may also be mild wheezing. In more severe cases, breathlessness with frothy sputum (pulmonary oedema) may develop.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2.</p> <p>Wheezing - If wheezing, administer oxygen and give two puffs of salbutamol (100 micrograms per puff) and five puffs of beclomethasone (50 micrograms per puff) every 15 minutes by spacer device for the first hour.</p> <p>At the same time SEEK MEDICAL ADVICE. Hospital treatment may be required.</p> <p>If wheezing continues after the first hour, continue with oxygen and give two puffs of salbutamol and five puffs of beclomethasone by spacer device every two hours for the next 12 hours, while awaiting medical advice. Then give two puffs four times a day of both salbutamol and beclomethasone if symptoms persist.</p>

Table 640

HYDROGEN SULPHIDE

General information

This gas is extremely toxic and has a general effect on the whole body. It has a strong odour of rotting eggs, although this may disappear because of paralysis of the sense of smell. It is an irritant of the lungs. It also damages the nervous system and may cause immediate death.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be mild redness and irritation at high concentrations.</p> <p><i>Eye contact</i></p> <p>At low concentrations, there will be irritation and redness. Higher concentrations produce severe watering with pain and aversion to light.</p> <p><i>Inhalation</i></p> <p>Low concentrations will cause a mild cough, irritation of the nose and throat, watering of the eyes, and occasionally chest pain when breathing. Bronchitis may develop after 24 to 36 hours. High concentrations may produce the rapid onset of coma, followed on occasions by convulsions. There may be severe difficulty in breathing with frothy sputum (pulmonary oedema). This can occur up to 72 hours after exposure.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>If the patient is conscious, he should be placed flat on his back and rest quietly under supervision. Give amyl nitrite as below.</p> <p>If the patient is unconscious, place in the unconscious position and insert a Guedel airway (see 5. 4). Start artificial respiration by the Silvester method (see 5. 3) and heart compression (see 5. 3) if breathing has stopped and the pulse cannot be felt. If the breathing and pulse are present, break an ampoule of amyl nitrite 0.17 mg into a handkerchief or cloth, and hold under the patient's nose so that he inhales the vapour. This should be repeated with a further ampoule at 3-minute intervals, using up to 5 ampoules. Emergency treatment: see 8. 3. Bronchitis: see 6. 1. 3. Pulmonary oedema: see 6.1.2. Convulsions: see 6.3.2.</p>

Table 645

HYDROGEN CYANIDE AND HALOGENATED CYANOGENS

General information

These gases and/or liquids are extremely toxic to the whole body, and death may occur very rapidly. Treatment must be given **immediately**. Some of these gases (particularly hydrogen cyanide) have a characteristic odour of bitter almonds.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be irritation and pain. These chemicals are absorbed through the skin, even as gases, producing similar signs to those of inhalation and ingestion (see below).</p> <p><i>Eye contact</i></p> <p>There may be irritation and redness. Burns may occur.</p> <p><i>Inhalation and ingestion</i></p> <p>There will be immediate irritation of the throat and mouth, followed by the rapid onset of shortness of breath, anxiety and loss of consciousness. The patient may have a smell of bitter almonds on his breath. Convulsions can occur and death may occur within 30 minutes.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p>If general symptoms occur, treat as described for inhalation and ingestion (see below).</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation and ingestion</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>If the patient is conscious, he should be placed flat on his back and rest quietly under supervision. Give amyl nitrite as below.</p> <p>If the patient is unconscious, place in the unconscious position and insert a Guedel airway (see 5. 4). Start artificial respiration by the Silvester method (see 5. 3) and heart compression (see 5. 3) if breathing has stopped and the pulse cannot be felt. If the breathing and pulse are present, break an ampoule of amyl nitrite 0. 17 mg into a handkerchief or cloth, and hold under the patient's nose so that he inhales the vapour. This should be repeated with a further ampoule at 3-minute intervals, using up to 5 ampoules.</p> <p>Emergency treatment: see 8. 3 and 8. 4.</p> <p>Convulsions: see 6. 3. 2.</p>

Table 700

ACIDS

General information

These chemicals are all corrosive, but they vary in the degree of their severity. They may cause severe chemical burns.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There will be redness and irritation. Strong acids cause chemical burns with severe pain.</p> <p><i>Eye contact</i></p> <p>There is redness, irritation and pain. Chemical burns may occur.</p> <p><i>Inhalation</i></p> <p>Weak acids and low concentration of strong acids produce a cough, tightness in the chest and shortness of breath. High concentrations of any acid may cause breathlessness with frothy sputum (pulmonary oedema). Bronchitis or pneumonia can occur.</p> <p><i>Ingestion</i></p> <p>Weak acids will give a burning sensation in the mouth with nausea and vomiting. Strong acids can produce severe vomiting with blood. Perforation of the gut can occur.</p>	<p><i>Skin contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED. Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED. Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Bronchitis: see 6. 1. 3. Pneumonia: see 6. 1. 4.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Internal bleeding: see 6. 4. 3. Perforation of the gut: see 6. 4. 4.</p>

Table 705

ALKALIS

General information

These chemicals are all corrosive, but they vary in the degree of their severity. They may cause severe chemical burns.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There will be pain followed by whiteness of the skin in the area of exposure. Blistering may occur. In severe cases, chemical burns can occur.</p> <p><i>Eye contact</i></p> <p>There will be pain, redness and watering of the eye. Chemical burns are likely to occur.</p> <p><i>Inhalation</i></p> <p>In mild cases, there may be shortness of breath, tightness of the chest, a cough and soreness in the throat. At high concentrations, severe breathlessness with frothy sputum (pulmonary oedema) can occur. This may be followed by circulatory collapse and unconsciousness.</p> <p><i>Ingestion</i></p> <p>There will be nausea, vomiting and soreness of the throat, with difficulty in swallowing. In severe cases, blood may be vomited and perforation of the gut can occur. Severe pain can occur even if there is no perforation of the gut.</p>	<p><i>Skin contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED. Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED. Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Circulatory collapse: see 6. 2. 1.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Internal bleeding: see 6. 4. 3. Perforation of the gut: see 6. 4. 4.</p>

Table 710

PHENOLS, NITROPHENOLS AND PICRATES

General information

These are extremely toxic chemicals. They are corrosive, and are rapidly absorbed through the intact skin. They are generally toxic to the whole body. **It is extremely important that any contaminated clothing should be removed at once.** Death can occur.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>These solutions cause severe chemical burns to the intact skin, which are usually painless. The severity of the burn may not therefore be appreciated. It appears as white wrinkled 'dead skin'. Many of these substances, e. g. phenol, are absorbed through the intact skin, causing symptoms similar to those of inhalation and of ingestion (see below). Cresols are irritants, causing redness. Picrates and dinitro-ortho-cresol (DNOC) stain the skin yellow, causing local irritation.</p> <p><i>Eye contact</i></p> <p>These chemicals will cause severe pain and redness. Chemical burns can occur. Permanent damage to the eye may occur.</p> <p><i>Inhalation</i></p> <p>There will be a burning sensation of the mouth and throat, often with a headache, sweating and nausea. More severe exposure may produce a rapid pulse and breathing rate. A high temperature may occur. In very severe cases breathlessness with frothy sputum (pulmonary oedema) may, rarely, occur. The patient can also develop mental agitation, confusion, heart failure and circulatory collapse. Convulsions are a possible complication.</p> <p><i>Ingestion</i></p> <p>There will be nausea, vomiting and abdominal pain. In severe cases, there are chemical burns of the mouth, gullet and stomach, producing pain, difficulty in swallowing and occasionally vomiting of blood. The pupils are often dilated, and the patient is pale and sweating. A high temperature may occur. Kidney failure may occur. Symptoms similar to those of inhalation can occur.</p>	<p><i>Skin contact</i></p> <p>Immediately remove contaminated clothing. Then wash the skin with water for 10 minutes. Then wash the skin with macrogol 300 (polyethylene glycol) solution (molecular wt. 300) for 10 minutes, changing the swabs regularly. Dress the burn as described in 6. 7.</p> <p><i>Eye contact</i></p> <p>Emergency treatment should be given immediately (see 8. 2).</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Heart failure: see 6. 2. 2.</p> <p>Circulatory collapse: see 6. 2. 1. Convulsions: see 6. 3. 2. High temperature: see 6. 6.</p> <p>Mental agitation: see 6. 3. 3.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Internal bleeding: see 6. 4. 3. Kidney failure: see 6. 5. 1.</p> <p>High temperature: see 6. 6.</p>

Table 711**CHLOROPHENOLS AND CHLOROPHENOLATES****General information**

These chemicals are irritants of the skin, mouth, throat and lungs. They are toxic to the nervous system, particularly pentachlorophenol.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be irritation and redness. A widespread skin rash can develop. They are absorbed through the intact skin and may produce symptoms similar to those of inhalation (see below).</p> <p><i>Eye contact</i></p> <p>There may be severe irritation, redness and watering.</p> <p><i>Inhalation</i></p> <p>There will be irritation of the nose and the throat, with nausea. In more severe cases, profuse sweating with a high temperature, nausea and vomiting occur. There will be shortness of breath and occasionally chest pain. This may be followed by drowsiness, convulsions and unconsciousness.</p> <p>Bronchitis can occur.</p> <p><i>Ingestion</i></p> <p>There will be nausea and vomiting, sometimes with abdominal pain. Drowsiness and shortness of breath can occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>Bronchitis: see 6. 1. 3.</p> <p>Convulsions: see 6. 3. 2.</p> <p>High temperature: see 6. 6.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p>

Table 715

PERMANGANATES

General information

These chemicals are severely corrosive to the mouth, gullet and stomach. They are particularly toxic if ingested.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There will be brown discoloration and irritation. Chemical burns can occur, particularly after prolonged contact.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p>
<p><i>Eye contact</i></p> <p>There will be redness and irritation. Chemical burns can occur.</p>	<p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>This is unlikely to occur, except if the solid is heated in fires. The fumes will cause severe irritation of the nose and throat, with a cough, chest pain and shortness of breath. Breathlessness with frothy sputum (pulmonary oedema) may occur.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2.</p>
<p><i>Ingestion</i></p> <p>There will be a burning sensation in the mouth and throat, with nausea and vomiting. The linings of the mouth may be swollen and coloured brown. Difficulty in breathing is occasionally experienced. In very severe cases, there may be vomiting of blood. Circulatory collapse and death can occur. Liver and kidney failure may occur, as late complications.</p>	<p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p> <p>Rinse the mouth out thoroughly with water. Internal bleeding: see 6. 4. 3. Circulatory collapse: see 6. 2. 1.</p> <p>Kidney failure: see 6. 5. 1.</p> <p>Liver failure: see 6. 4. 5.</p> <p>RADIO FOR MEDICAL ADVICE.</p>

Table 720

HYDRAZINE AND COMPOUNDS

General information

These are highly toxic chemicals that fume in air. They are extremely irritant to the skin, mouth, throat, and lungs, and may depress the nervous system.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There will be severe irritation and redness from the vapour. The liquid causes severe chemical burns. It is absorbed through the intact skin and may produce symptoms similar to those of inhalation and of ingestion (see below).</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p>IMMEDIATE ACTION IS REQUIRED after liquid contact.</p>
<p><i>Eye contact</i></p> <p>The vapour produces severe irritation and redness. It may also result in temporary loss of vision, lasting for up to 24 hours. The liquid causes severe chemical burns. Permanent damage to the eye may occur.</p>	<p><i>Eye contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>Emergency treatment: see 8. 2.</p> <p>If loss of vision occurs, the patient should be transferred ashore as soon as possible.</p>
<p><i>Inhalation</i></p> <p>In mild cases, there will be irritation of the nose, mouth and throat, with a cough and shortness of breath. Severe exposure can result in breathlessness with frothy sputum (pulmonary oedema), weakness, vomiting, loss of weight, mental agitation and occasionally convulsions. Liver and kidney failure may occur.</p> <p>Ingestion There will be nausea and vomiting with abdominal pain. Perforation of the gut can occur. Symptoms similar to those of inhalation may develop (see above).</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3</p> <p>Pulmonary oedema: see 6. 1. 2.</p> <p>Convulsions: see 6. 3. 2.</p> <p>Liver failure: see 6. 4. 5.</p> <p>Kidney failure: see 6. 5. 1.</p> <p>Mental agitation: see 6. 3. 3.</p> <p>Ingestion Emergency treatment: see 8. 4.</p> <p>Perforation of the gut: see 6. 4. 4.</p>

Table 725

AMMONIA AND COMPOUNDS

General information

Ammonia gas and solutions containing ammonia are severe corrosives of the skin and lungs. They have a strong pungent odour. Liquid anhydrous ammonia and concentrated solutions cause severe damage to the skin and eyes. Death may occur.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be redness and irritation. Chemical burns may occur.</p> <p><i>Eye contact</i></p> <p>There may be redness and severe irritation. Chemical burns can occur and there may be temporary loss of vision.</p> <p>Permanent damage to the eye can occur.</p> <p><i>Inhalation</i></p> <p>Mild exposure usually results in irritation of the mouth, nose and throat. There may be a cough, fever and shortness of breath. Severe exposure can cause breathlessness with frothy sputum (pulmonary oedema), wheezing, chest pain and circulatory collapse. Bronchitis may be a complication.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1</p> <p><i>Eye contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED. Emergency treatment: see 8. 2.</p> <p>If loss of vision occurs, the patient should be transferred ashore as soon as possible.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Circulatory collapse: see 6. 2. 1. Bronchitis: see 6. 1. 3.</p> <p>Wheezing - If wheezing, administer oxygen and give two puffs of salbutamol (100 micrograms per puff) and five puffs of beclomethasone (50 micrograms per puff) every 15 minutes by spacer device for the first hour.</p> <p>At the same time SEEK MEDICAL ADVICE.</p> <p>Hospital treatment may be required.</p> <p>If wheezing continues after the first hour, continue with oxygen and give two puffs of salbutamol and five puffs of beclomethasone by spacer device every two hours for the next 12 hours, while awaiting medical advice. Then give two puffs four times a day of both salbutamol and beclomethasone if symptoms persist.</p>

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Ingestion

This is unlikely to occur. There will be nausea and vomiting, and, in severe cases, blood may be vomited and perforation of the gut may occur.

Ingestion

Emergency treatment: [see 8. 4.](#)

Perforation of the gut: [see 6. 4. 4.](#) Internal bleeding: [see 6. 4. 3.](#)



Table 735

PEROXIDES

General information

These chemicals vary in their degree of corrosive action. Most of them are irritants of the skin, mouth, throat and lungs, and are particularly harmful to the eyes.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be severe redness and irritation. Chemical burns can occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p>
<p><i>Eye contact</i></p> <p>There may be severe redness and irritation. Chemical burns can occur either immediately, or in some cases up to one week later. Permanent damage to the eye can occur.</p>	<p><i>Eye contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>Emergency treatment: see 8. 2.</p>
<p><i>Inhalation</i></p> <p>In mild cases, there may be shortness of breath, tightness of the chest, a sore throat and a cough. Bronchitis can develop. At high concentrations, severe breathlessness with frothy sputum (pulmonary oedema) can occur. This may be followed by circulatory collapse and unconsciousness.</p>	<p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>Pulmonary oedema: see 6. 1. 2.</p> <p>Circulatory collapse: see 6. 2. 1.</p> <p>Bronchitis: see 6. 1. 3.</p>
<p><i>Ingestion</i></p> <p>There will be nausea, vomiting and soreness of the throat with difficulty in swallowing. In severe cases, blood may be vomited and perforation of the gut can occur. Severe pain will occur even if there is no perforation of the gut.</p>	<p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p> <p>Internal bleeding: see 6. 4. 3.</p> <p>Perforation of the gut: see 6. 4. 4.</p>

Table 740**CHLORINE, BROMINE, IODINE AND TEAR GAS****General information**

These chemicals are all highly irritant and corrosive to the skin, mouth, throat and lungs. Also covered by this table are those compounds which are corrosive and contain chlorine, bromine and iodine.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There will be severe redness and irritation. A red skin rash with small septic blisters and ulcers may develop. Chemical burns may occur. Many of these chemicals are absorbed through the intact skin, producing signs similar to those of inhalation (see below).</p> <p><i>Eye contact</i></p> <p>There will be severe redness, irritation and watering. Chemical burns may occur.</p> <p>Bromine is particularly dangerous.</p> <p><i>Inhalation</i></p> <p>Low concentrations will cause shortness of breath, a cough, chest pain and headache. Pneumonia may develop. High concentrations may produce the rapid-onset of severe shortness of breath with frothy sputum (pulmonary oedema).</p> <p>The patient is often nauseated, with vomiting and upper abdominal pain. Unconsciousness may occur.</p> <p><i>Ingestion</i></p> <p>There will be nausea, headache, vomiting and upper abdominal pain.</p> <p>Blood may be vomited.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3. Pulmonary oedema: see 6. 1. 2. Pneumonia: see 6.1.4.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Internal bleeding: see 6. 4. 3.</p>

Table 741**CHLORITES AND HYPOCHLORITES****General information**

These chemicals are severe irritants of the skin, mouth, throat and lungs. They are rapidly destroyed inside the body and do not usually cause serious general symptoms of poisoning.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There will be redness and severe irritation. Chemical burns may occur.</p> <p><i>Eye contact</i></p> <p>There will be severe pain, redness and watering of the eyes. Chemical burns can occur. Permanent damage to the eye can occur.</p> <p><i>Inhalation</i></p> <p>In low concentrations, there will be irritation of the throat, soreness of the chest, a cough and shortness of breath. Vomiting and upper abdominal pain may occur. Severe exposure may produce breathlessness with frothy sputum (pulmonary oedema). They are absorbed through the lungs, causing unconsciousness and occasionally circulatory collapse.</p> <p><i>Ingestion</i></p> <p>There will be nausea, vomiting and abdominal pain. In severe cases there may be difficulty in swallowing. Blood may be vomited and perforation of the gut can occur. Severe pain can occur even if there is no perforation.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>Pulmonary oedema: see 6. 1. 2.</p> <p>Circulatory collapse: see 6. 2. 1.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p> <p>Perforation of the gut: see 6. 4. 4.</p> <p>Internal bleeding: see 6. 4. 3.</p>

Table 745**CHLORATES, PERCHLORATES AND BROMATES****General information**

These chemicals are corrosive to the skin and lungs. They also can damage the blood cells, causing asphyxia.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There will be redness and irritation. Chemical burns can occur.</p> <p><i>Eye contact</i></p> <p>There will be severe redness and irritation. Chemical burns can occur.</p> <p><i>Inhalation</i></p> <p>This is unlikely to occur, but may produce shortness of breath, a cough and chest pain. Symptoms similar to those of ingestion may develop (see below).</p> <p><i>Ingestion</i></p> <p>There will be nausea, vomiting and abdominal pain. Bleeding from the stomach may occur. These chemicals can be absorbed from the gut, producing headache, drowsiness and unconsciousness. The patient's hands, lips and face become blue and subsequently the skin turns yellow because of damage to the blood cells (methaemoglobinaemia). Kidney and liver failure may occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4. Internal bleeding: see 6. 4. 3.</p> <p>Liver failure: see 6. 4. 5. Kidney failure: see 6. 5. 1.</p> <p>Methaemoglobinaemia If these signs develop, and if the patient is conscious, give 20 ml of methylene blue 1% by mouth. Also give 1 g of ascorbic acid by mouth and repeat every 4 hours for 24 hours. If the patient is unconscious, give 5 ml of 10% ascorbic acid intramuscularly.</p> <p>RADIO FOR MEDICAL ADVICE.</p>

Table 750

FLUORINE AND FLUORIDES

General information

These chemicals, particularly fluorine and hydrogen fluoride, are extremely corrosive. They are highly toxic to the whole body. In addition, URANIUM HEXAFLUORIDE may cause kidney failure (see 6. 5. 1).

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There will be severe pain and redness. The skin may be destroyed immediately, as with a heat burn. In other cases, there is persistent pain and redness at the site of contact, indicating continuing destruction of tissue underneath the skin. Therefore, the surface skin may not be destroyed for several days.</p> <p><i>Eye contact</i></p> <p>There will be severe pain and redness. Chemical burns can occur. Permanent damage to the eye may occur.</p> <p><i>Inhalation</i></p> <p>There will be shortness of breath with a cough and soreness of the chest. Bronchitis may develop. In severe cases breathlessness with frothy sputum (pulmonary oedema) can occur. There may be blurring of vision and muscle spasms with "clawing" of the hands.</p> <p><i>Ingestion</i></p> <p>Vomiting, abdominal pain and diarrhoea will occur. There may be blood in the vomit and in the faeces; in severe cases muscle spasms with clawing of the hands and the feet, blurring of vision and convulsions can occur.</p>	<p><i>Skin contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>Wash with water for 10 minutes.</p> <p>Rub in calcium gluconate gel over the area of the burn until the pain subsides. If the pain persists, apply a dressing containing calcium gluconate gel over the burn. Change this every 8 hours until the pain and redness disappear.</p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8.3. Bronchitis: see 6.1.3. Pulmonary oedema: see 6. 1. 2.</p> <p><i>Ingestion</i></p> <p>Give calcium gluconate effervescent tablets 5 g in 250 ml (1/2 pint) of water by mouth immediately. Emergency treatment: see 8.4. Convulsions: see 6.3.2. Internal bleeding: see 6. 4. 3</p>

Table 760

CORROSIVES, N. O. S.

General information

These chemicals are corrosive and may be toxic to the body or react to produce corrosive substances. They vary in the degree of their severity and may be acids or alkalis. They may cause severe chemical burns.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There will be pain followed by whiteness or redness of the skin in the area of exposure. Blistering may occur. In severe cases, chemical burns can occur.</p> <p><i>Eye contact</i></p> <p>There will be pain, redness and watering of the eye. Chemical burns are likely to occur.</p> <p><i>Inhalation</i></p> <p>In mild cases, there may be shortness of breath, tightness of the chest, a cough and soreness in the throat. At high concentrations, severe breathlessness with frothy sputum (pulmonary oedema) can occur. Bronchitis or pneumonia can occur. This may be followed by circulatory collapse and unconsciousness.</p> <p><i>Ingestion</i></p> <p>There will be nausea, vomiting and soreness of the throat, with difficulty in swallowing. In severe cases, blood may be vomited and perforation of the gut can occur. Severe pain can occur even if there is no perforation of the gut.</p>	<p><i>Skin contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>IMMEDIATE ACTION IS REQUIRED.</p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>Pulmonary oedema: see 6. 1. 2.</p> <p>Bronchitis: see 6. 1. 3.</p> <p>Pneumonia: see 6. 1. 4.</p> <p>Circulatory collapse: see 6. 2. 1.</p> <p><i>Ingestion</i></p> <p>Emergency treatment: see 8. 4.</p> <p>Internal bleeding: see 6. 4. 3.</p> <p>Perforation of the gut: see 6. 4. 4.</p>

Table 800

NICOTINE AND COMPOUNDS

General information

These chemicals may have a severe toxic action on the heart, blood vessels and nervous system.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There is usually only mild irritation. They are absorbed through the skin, causing toxic symptoms similar to those of inhalation (see below).</p> <p><i>Eye contact</i></p> <p>There may be redness and irritation.</p> <p><i>Inhalation and ingestion</i></p> <p>There may be a cough with shortness of breath and a headache. In more severe cases, the symptoms include dizziness, general weakness, nausea, vomiting, diarrhoea, and irregular pulse rate, pain in the centre of the chest, difficulty in breathing, sweating, wide pupils and a fall in the blood pressure. In very severe cases, there may be blue discoloration of the skin, mental confusion, convulsions and unconsciousness.</p> <p>Death may occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation and ingestion</i></p> <p>Emergency treatment: see 8. 3 and 8. 4.</p> <p>Convulsions: see 6. 3. 2.</p> <p>Mental confusion: see 6. 3. 3.</p> <p>If there is difficulty in breathing and/or a slow or irregular pulse, give atropine sulphate 1 mg intramuscularly. If there is no improvement after 1 hour, then give a further 1 mg of atropine intramuscularly.</p> <p>Do not give more than 2 doses.</p> <p>RADIO FOR MEDICAL ADVICE.</p>

Table 805

STRYCHNINE AND BRUCINE

General information

These chemicals are extremely toxic to the nervous system.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There may be mild irritation.</p> <p><i>Eye contact</i></p> <p>There may be mild irritation and redness.</p> <p><i>Inhalation and ingestion</i></p> <p>There may be a short interval of up to 30 minutes before symptoms occur.</p> <p>There is a feeling of numbness followed by stiffness of the face and neck muscles. After this, severe exposure may cause twitching of the muscles with characteristic attacks of convulsions, lasting one to two minutes, at regular intervals. These convulsions consist of extended arms and legs, the body is arched and may be supported by the head and heels only. The face expresses fear and breathing may stop. Consciousness may be retained. The eyes tend to bulge and there is blue discoloration of the skin.</p> <p>Death may occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation and ingestion</i></p> <p>Emergency treatment: see 8. 3. and 8. 4</p> <p>Convulsions: see 6. 3. 2.</p> <p>The patient should be kept in a quiet, dark room, since any noise may set off a convulsion.</p> <p>RADIO FOR MEDICAL ADVICE.</p>

CASTOR BEANS

General information

The beans or the meal may generate serious reactions in those who are allergic to them, after contact with skin, eyes or mucous membranes. After ingestion of beans, there may be destruction of **red blood cells** and injury to all other cells of the body.

RADIO FOR MEDICAL ADVICE.

Signs and symptoms	Treatment
<p><i>Skin contact</i></p> <p>There will be redness, irritation and swelling of the skin (urticaria).</p> <p><i>Eye contact</i></p> <p>There will be redness, irritation and swelling of the eyelids.</p> <p><i>Inhalation</i></p> <p>There will be shortness of breath with cough. In severe cases, wheezing with severe breathlessness will occur.</p>	<p><i>Skin contact</i></p> <p>Emergency treatment: see 8. 1.</p> <p>If severe swelling of the skin occurs, give chlorphenamine (chlorpheniramine) 10 mg intramuscularly.</p> <p><i>Eye contact</i></p> <p>Emergency treatment: see 8. 2.</p> <p><i>Inhalation</i></p> <p>Emergency treatment: see 8. 3.</p> <p>Wheezing - If wheezing, administer oxygen and give two puffs of salbutamol (100 micrograms per puff) and five puffs of beclomethasone (50 micrograms per puff) every 15 minutes by spacer device for the first hour.</p> <p>At the same time SEEK MEDICAL ADVICE</p> <p>Hospital treatment may be required.</p> <p>If wheezing continues after the first hour, continue with oxygen and give two puffs of salbutamol and five puffs of beclomethasone by spacer device every two hours for the next 12 hours, while awaiting medical advice. Then give two puffs four times a day of both salbutamol and beclomethasone if symptoms persist.</p>

(continued on next page)

(continued)

Ingestion

There will be burning of the mouth, nausea, vomiting and diarrhoea. In severe cases there may be blue discoloration of the lips, convulsions and circulatory collapse. Kidney failure may occur later. Death can occur.

Ingestion

Emergency treatment: [see 8. 4.](#)

If there is blue discoloration of the lips, give oxygen: [see 8. 3. 1.](#)

Convulsions: [see 6. 3. 2.](#) Circulatory collapse: [see 6. 2. 1.](#) Kidney failure: [see 6. 5. 1.](#)

10 INDEX OF CHEMICAL TABLES

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Chemical group	Table no.	Chemical group	Table no.
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Camphor oil	331	Ketones	300
Carbamate pesticides	505	Lead and compounds	110
Carbon dioxide	615	Lead tetraethyl	111
Carbon monoxide	616	Lead tetramethyl	111
Carbon sulphides	210	Liquefied gases	620
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Chlorates	745	Mercaptans	375
Chlorinated hydrocarbons	340	Mercury and compounds	105
Chlorine	740	Metal alkyls	170
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Chloroacetates	540	Methanol	306
Chloroarsines	101	Methyl alcohol	306
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Phenyl urea pesticides	520	Tellurium hexafluoride	630
Phosgene	600	Thallium and compounds	140
Phosphides	205	Triazine pesticides	530
Phosphine	601	Tricresyl phosphate	355
Phosphorus (yellow or white)	200	Turpentine	313
Phthalimide pesticides	530	Vanadium and compounds	135
Picrates	710	Zinc and compounds	145

11 LIST OF MEDICINES

Note:

Labelling, storage and the dispensing method should in general conform to the relevant specifications in the [IMGS](#).

Contents and storage conditions to be checked at frequent intervals, taking into account manufacturers' instructions, including, e. g., durability and, in some cases, the need to jettison residual medicine after initial use.

Name ¹	Recommended standard unit	Format	Quantity ²
Aminophylline	360 mg	Suppository	60
Ampicillin	500 mg	Capsule	100
Ampicillin	500 mg	Ampoule	100
Amyl nitrite	0. 17 mg in 0. 2 ml	Ampoule	96
Ascorbic acid (Vitamin C)	1 g	Tablet	120
Ascorbic acid (Vitamin C)	500 mg in 5 ml	Ampoule	20
Atropine sulphate	1 mg in 1 ml	Ampoule	200
Beclomethasone aerosol inhaler unit or equivalent steroid inhaler	50 mg per dose	200-dose unit	4
Calcium gluconate 2%	25 g	Tube	6
Calcium gluconate effervescent	1g	Tablet	10
Charcoal, activated	5 g	Sachet or powder	10
Chlorphenamine (Chlorpheniramine)	10 mg in 1 ml	Ampoule	20
Chlorpromazine	25 mg in 1 ml	Ampoule	80
Diazepam	10 mg in 2 ml	Ampoule	60
Dimercaprol	100 mg in 2 ml	Ampoule	160
Ethyl alcohol 10% solution	500ml	Bottle	4
Fluorescein sodium 1% or 2%		Eye test strip	100
Furosemide (Frusemide)	20 mg in 2 ml	Ampoule	40
Furosemide (Frusemide)	40 mg	Tablet	80
Glucose	500 g	Powder	1
Macrogol 300 (Polyethylene glycol m. w. 300)	1 litre	Bottle	2
Magnesium trisilicate compound	250 mg	Tablet	40
Methylene blue 1 %	10ml	Ampoule	40

* See notes 1 and 2 on page 164

Name ¹	Recommended standard unit	Format	Quantity ²
Metoclopramide hydrochloride	10 mg in 2 ml	Ampoule	60
Morphine sulphate	15 mg in 1 ml	Ampoule	30
Naloxone hydrochloride	0.4 mg in 1 ml	Ampoule	30
Oxygen-giving set, comprising the following: 2 x oxygen cylinders with 1-1 1/2 hours' supply of oxygen 1 flowmeter unit giving a setting of 4 litres per minute 1 pressure-regulating unit 1 set of tubing 5 x 24% oxygen disposable masks 5 x 35% oxygen disposable masks. Each part constructed so that it can only be assembled in the correct manner			
Paracetamol	500 mg	Tablet	120
Phytomenadione (Vitamin K ₁)	10 mg in 1 ml	Ampoule	4
Salbutamol aerosol inhaler unit	0.1 mg per dose	200-dose unit	4
Spacer inhaler for use with salbutamol inhalers and beclomethasone inhalers			
Sulfamethoxazole+ trimethoprim (Co-trimoxazole)	400+ 80 mg (480 mg)	Tablet	50
Syringes, plastic, disposable, sterile, individually sealed, 5 ml, with intramuscular needle			200
Tetracycline hydrochloride, 1% ointment	4g	Tube	10

See notes 1 and 2 on page 164

Note: Also needed in connection with chemical poisoning are: aspirin, soluble (acetylsalicylic acid), lint, vaseline gauze dressing (s), crepe bandages, tubular dressings, sterile water, cotton wool. It is assumed that these will be found in the ordinary medical supplies carried.

¹ The medicines are listed under their international non-proprietary (generic) names (INN) for pharmaceutical substances recommended in *International Non-proprietary Names (INN) for Pharmaceutical Substances, Cumulative List No. 7* (Geneva: World Health Organization (WHO), 1988). In some countries the recommended medicines may not be available under these non-proprietary names and Administrations should provide a cross-index of the non-proprietary names and the proprietary names of the available and equivalent medicines in their country. In establishing a national list of medicines, the guidelines of WHO as contained in *The Use of Essential Drugs, Technical Report Series 796* (Geneva: WHO, 1990), should be taken into account.

² The recommended quantities of medicines to be carried on board are based on an estimate of risks. **They should generally be sufficient to treat:**

In case of inhalation:

- (1) a complete crew of about 24 in the event of a major emergency (e. g. explosion) for a period of 24 hours, by which time evacuation can be expected to have been completed or additional supplies of medicines to have been brought in by the rescue services;
- (2) a few persons exposed in a lesser emergency until the ship reaches the next port or the casualties are cured;

. 2 In case of ingestion or eye contact, one or two persons until landed or cured; and

. 3 In case of skin contact (leakage or spillage), four persons until landed or cured.

As the new *International Medical Guide for Ships (IMGS)* has now been published by the World Health Organization (WHO), both lists of medicines and recommended quantities will be reviewed in parallel to establish the quantity of each medicine required for ships of categories A, B and C, as defined in the *IMGS*.