LABORATORY FIRST AID

Notes on laboratory first aid
This chart outlines the first aid treatment of the type of injury which is most likely to be sustained in a chemical laboratory. Such injuries are caused not only by chemical substances; they often consist of cuts from broken glass tube or apparatus, burns from hot pipes or steam, abrasions caused by contact with carboys or packing cases etc. The treatments suggested must be considered as first aid: they are not a substitute for attention by a doctor or trained nurse.

Any injury, however small, must receive prompt treatment. Delay may result in a minor injury becoming a major one due to infection in the case of a slight wound or scratch, or due to shock in the case of a slightly burned or gassed casualty The first aid measures suggested are necessarily brief; they must be applied with common sense. For example, if medical attention is required a doctor or an ambulance must be summoned at once. In the case of shock the casualty must be made to lie down and rest; he should be kept warm by covering him with a light blanket.

(Hot water bottles should not be applied). Should a casualty stop breathing, artificial respiration must be started without delay, before any other treatment is resorted to, and must be continued until breathing is resumed. Wash your hands thoroughly before treating a casualty suffering from a cut or wound, a burn or any eye injury, In all cases of skin, eye or mouth contact with an injurious chemical substance, thorough irrigation cr rinsing with water should be the first treatment.

Treatment of cuts and scratches
Wounds, cuts, or scratches, however small, should receive immediate attention. The wound should be covered as soon as possible with a sterilized wound dressing. If the skin around the wound is dirty or is contaminated with a water-soluble chemical substance, careful washing with clean water should be carried out. If the wound area is contaminated with a water-insoluble chemical, careful swabbing with cotton wool and surgical spirit should be carried out, followed by the application of a dressing

in the normal manner. Except in the case of small cuts or scratches, it is advisable to obtain medical attention, as stitching of the wound may be necessary. In any case, should an injury become inflamed or painful, medical attention must be obtained.

Treatment of burns
Heat Burns or Scalds a serious heat burn or scald should have a dry sterilised dressing applied (not an adhesive

wound dressing) and medical attention should be obtained immediately. An extensive burn should be covered loosely with a clean towel. Clothing which is sticking to a burn should not be removed, nor should blisters be pricked.

Chemical burns
Chemical burns should be flushed gently with plenty of cold water, and all contaminated clothing should be removed. (The suggested treatment for burns caused by skin contact with certain chemical compounds is shown below in this chart).

Chemical	Affected area			
	EYES	LUNGS	SKIN	MOUTH
Acetaldehyde		A		O
Acetic acid		A	F	P
Acetic anhydride		A	F	P
Acetonitrile		B	Ga	O
Acetyl chloride		B	F	P
Acrole1n		E	F	O
Allylalcohol		B	F	O
Allyl bromide		A	G	O
Allyl chloride		B	G	O
Aluminium chloride anhydrous		A	F	P
Ammonia & solution		B	F	Q
Ammonium hydroxide		B	F	Q
Ammonium sulphide solution		B	F	O
Amyl nitrite		B		O
Aniline		B	G	O
Antimony compounds			G	O
Arsenic & compounds		B	G	O
Barium compounds				R
Benzene		B	Ga	O
Benzidine& salts			G	O
Benzoyl chloride		A	G	P
Benzyl bromide		A	G	O
Benzyl chloride		A	G	O
Beryllium compounds		C	K	O
Boron halides		B	F	P
Bromine		B	H	T
Bromo-aceticacid			I	P
Bromo-ethane		B	G	O
Bromo-methane		B	J	T
Cadmium compounds		B		O
Carbon disulphide		E		O
Carbon monoxide		E		
Carbon tetrachloride		E	Ga	O
Caustic potash			F	Q
Caustiic soda			F	Q
Chlorine		B	F	
Chloro-acetic acid			J	P
Chloro-aniline		A	G	O
L-chlorq-2:4-dlnitro benzene		B	G	O
L-chloro-2:3-epoxy propane		B	G	O
2-chloro-ethanol		C	G	O
Chloroform		E		O
Chloro-nitro-anilines		A	G	O
Chloro-phenols		B	G	S
Chloro-sulphonicacid		A	I	P
Chromates&dichromates		A	F	O
Chromic acid		A	F	P
Chromium.trioxide		E	F	P
Coal gas		A		
Copper compounds		A		O
Cresols		D	G	S
Cyanide		A	F	U
Diamino-ethane		A	F	O
1:2-dibromo-ethane'		E	G	O
1:2-d1chloro-ethane		A		O
1:2-dichloro-ethylene		B		O
Dichloro-methane		B		O
Diethyl ether		B		O
Dimethylamine & solutions		B	F	T
N:n-dimethyl-anlllne		B	C	O
Dimethyl sulphate		C	F	P
Dinltro-o-cresol		B	G	O
Dinitro-phenols		B	G	S
Diqxan (dioxane)		B		O
Epichlorhydrin		B	G	O
Ethane-diol				O
Ether		B		O
Ethyl bromide		B	G	O
Ethyl chloro-acetate		B	G	O
Ethyl chloro formate		B	G	O
Ethylenechlorhydrin		C	G	O
Ethylene chloride		E		O
Ethylene dibromide		A	G	O
Ethylene dichloride		E		O
Ethylene-diamine		A	F	O
Ethylene glycol				O
Ethylene oxide		E	Ga	V
Ferric chloride anhydrous		A	F	P
Fluorides		B	G	O
Fluoro boric acid & salts		A	F	T
Flurosilicic acid & salts		A	F	T
Formaldehyde solution		B	F	Y
Formalin		B	F	Y
Formic acid		A	F	P
Fuming sulphuric acid		B	F	P
Hydrazine hydrate			F	T
Hydriodic acid		A	F	P
Hydrogen iodide		A	F	P
Hydrobromic acid		A	F	P
Hydrogen bromide		A	F	P
Hydrochloric acid		A	F	P
Hydrogen chloride		A	F	P
Hydrocyanic acid		D	F	U
Hydrogen cyanide		D	F	U
Hydrofluoric acid		B	L	P
Hydrogen fluoride		B	L	P
Hydrogen peroxide			F	T
Hydrogen sulphide		E		
Hydroxy - ammonium salts			F	T

First Aid Measures

EYE

Irrigate the eyes thoroughly with water obtain medical attention
- in severe cases
- when splashing or direct contact has occurred

In the case of hydrofluoric acid the eyes must be irrigated with cold water for at least 15 minutes and 0.03% (1 in 30 000) bkc soln. To be use for prolonged irrigation for 1 to 3 hrs.

LUNGS

A Remove from exposure rest and keep warm.

B Remove from exposure rest and keep warm in severe cases, or if exposure has been great, obtain medical attention

C Remove from exposure rest and keep warm. Obtain medical attention.

D Remove from exposure rest and keep warm. If breathing, break a capsule of amyl nitrite and give to casulaty by inhalation for 15-30 seconds. Reapeat every 2-3 minutes. Apply artificial respiration if breathing has stopped. In any case obtain medical attention at once.

E Remove from exposure rest and keep warm. In severe cases obtain medical attention and apply artificial respiration if breathing has stopped.

SKIN

F Drench the skin with plenty of water. Romove contaminated clothing and wash before re-use in severe cases. Obtain medical attention

G Ga: Drench the skin with water and wash with soap andwater. Remove contaminated clothing and wash re-use. Clothing to be thoroughly aired instead of washed.

H Drench the skin with water and then bathe with a dilute solution of sodium thiosulphate in water. Obtain medical attention.

I Drench the skin with water. Blisters or burns must receive medical attention. Do not prick the blisters remove contaminated clothing and washbefore re-use

J Drench the skin with water. And wash thoroughly with soap and water. Blister or burns must receive medical attention. Remove contaminated clothing and wash before re-use.

K Drench the skin with water after removing any adhering metal or penterating particles. Except when contact has been slight. Obtain medical attention.

SKIN

L Irrigate the skin immediately and continuously with cold water until medical attention is obtained. Pay particular attention to the skin under the fingernails. If medical attention is delayed, apply a dilute solution of ammonia in water. Remove contaminated clothing and wash before re-use in case of hydrofluoric acid apply paste of calcium gluconate on affected part.

M If skin contact is believed to have been prolonged, medical observation will be required.

N Drench the skin with plenty of water and then swab with a 3% solution of copper sulphate in water. (this will convert phosphorus to a black copper. salt which can be readily seen and removed). obtain medical attention.

MOUTH

O Wash out the mouth thoroughly with water and give an emetic. Obtain medical attention.

P Wash out the mouth thoroughly with water and give plenty of water to drink, followed by milk of magnesia. Obtain medical attention.

Q Wash out the mouth thoroughly with water give plenty of water, followed by vinegar or 1% acetic acid to drink. Obtain medical attention.

R Wash out mouth thoroughly with water. Give two tablespoonfuls of magnesium sulphate (epsom) (salts) in water, and then an emetic, rest and keep warm. Obtain medical attention.

S Wash out the mouth thoroughly with water. give plenty of water to drink, followed by two table-spoonfuls of magnesium sulphate (epsom salts) in water obtain medical attention.

T Wash out the mouth thoroughly with water. And give lafge quanitities of water to drink.medical attention.

U Give cyanide antidote. If breathing, break capsule of amyl nitrite and give to inhale for 15-30 seconds, repeat every 2-3 minutes. apply aftificial respiration if breathing has stopped. In any case obtain medical attention.

V Wash out the mouth with water. Obtain medical attention.

W Wash out the mouth thofoughly with a 1% solution of sodium thiosulphate in water and give some solution to drink, followed by an emetic. Medical attention.

X If swallowed obtain medical attention.

Y Wash out the mouth thoroughly with water and give a large quantity of milk to drink. Obtain medical attention.

Chemical	Affected area			
	EYES	LUNGS	SKIN	MOUTH
Hydroxylamine salts			F	O
Iodicacid		A	H	P
Iodine		A	F	P
Iodine pentoxide		A	F	O
Iodo-methane		B		P
Lead salts			M	O
Mercury		B	G/M	O
Mercury compounds		C	Ga	O
Methanqlic compounds		B	Ga	O
Methyl alcohol		B	F	P
Methylamine & solutions		B	G	Q
N-methyl-aniline		B	J	Q
Methyl bromide		B	Ga	O
Methyl cyanide		B		O
Methylene chloride		B	F	O
Methyl iodide		B	F	O
Methyl sulphate		C	G	O
Naphthylamine & salts			G	R
Nickel salts		A	G	O
Nitric acid		B	F	O
Nitro-anilines		A	G	P
Nitro-benzene		B	G	O
Nitrogen dioxide		B		O
Nitro-phenols		A	F	O
P-nitro-phenyl-hydrazine		A	G	P
Nitro-toluenes		B	G	T
Nitrous fumes		B		P
Oleum		B	F	O
Orthophosphoricacid			G	T
Oxalates		C	F	O
Oxalic acid		B	G	O
Pentachlorq ethane		B	G	O
Pentachloro-phenol			F	Q
Perchloric acid			G	Q
Perchloro-ethylene		A	J	
Phenol		A	F	P
Phenol-disulphonicacid			G	O
Phenylene-damines			G	O
Phenyl-hydrazine		B	Ga	O
Phosgene		C	F	O
Phosphoric acid			F	O
Phosphoric oxide		B	N	O
Phosphorus (yellow)		B	F	S
Phosphorus qxychloride		B	F	P
Phosphorus pentachloride		B	F	O
Phosphorus pentqxide		B	F	P
Phosphorus trichloride		B	F	P
Phosphoryl chloride		B	G	
Picric acid			K	O
Potassium metal			F	S
Potassium dichromate		A	F	U
Potassium bisulhate			F	O
Potassium cyanide		D	F	O
Potassium hydrogen sulphate			F	O
Potassium hydroxide		D	F	O
Prussicacid		A	F	O
Pyripine			G	O
Resorcinol		A	G	T
Seleniums compounds		A	F	O
Silicon tetrachloride			F	P
Silver nitrate		A	G	O
Soda asbestos			K	S
Sodium metal or amalgam		A	F	O
Sodium chromate			F	O
Sodium bisulphate		D	F	O
Sodium cyanide		A	F	O
Sodium dichromate			F	O
Sodium ethoxide		B	G	O
Sodium fluoride			F	O
Sodium hydrogen sulphate			F	O
Sodium hydroxide			F	O
Sodium hypochlorite solution			F	O
Sodium methoxide			G	O
Sodium oxalate		A	F	O
Sodium sulphide			G	O
Stannic chloride anhydrous		B	F	V
Sulphonicacid		B	I	P
Sulphur chloride		B	I	O
Sulphur dichloride		E		T
Sulphur dioxide				T
Sulphuretted hydrogen		B	I	Y
Sulphuric acid		A	I	Y
Sulphurylchloride		B	G	P
Tellurium & compounds		A		P
Tetrachloro-ethane		B	G	T
Tetrachloro-ethylene		B	G	P
Thallium & salts		B	I	P
Thionyl chloride		B	G	P
Titanic chloride		A	G	P
Titanium tetrachloride		A	Ga	P
Toluene			G	P
Toluidines		A	I	U
Trichloro-aceticacid		B		U
Trichloro-ethylene		B	F	P
Trimethylamine & solutions		B		P
Uranium compounds		A		T
Vanadium compounds		A	Ga	
Xylenes			G	T
Xylenols				

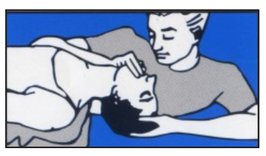
'Mouth-to-Mouth' Artificial Respiration

For a great majority of casualties, when breathing has stopped the 'Mouth-to-mouth' method of artificial respiration is probably the most effective. It is simple to apply, even by operators with the minimum of training. Where injuries to the mouth or face are apparent, or where cyanide poisoning is known or suspected, the well-known Holger-Nielson 'back pressure arm-lift method' should be adopted; in all other cases where breathing has stopped, the 'mouth-to-mouth' method shown in the illustrations should be immediately applied.

1. **Positioning the head**
(a) The casualty is quickly turned on his back.

(b) The casualty's head is tilted back to open the air passages. If a cushion, folded coat or blanket can be placed under the shoulders without delay, this should be done.

2. Inflation
The casualty's nose is kept closed by pinching. The operator takes a deep breath, applies his mouth to the casualty's mouth and inflates the lungs by blowing air into the mouth.



3. Exhalation
When the casualty's chest rises, the operator removes his mouth and turns his head to one side to allow air to escape from the casualty's lungs. The inflation exhalation cycle (steps 2 and 3) is repeated continuously at a rate not exceeding 10-12 breaths per minute, until there are signs or returning natural respiration. The operator adjusts his breathing to coincide with the casualty's returning respiration.

NOTES
(i) When it is apparent that a casualty has stopped breathing, medical attention must be obtained as soon as possible, but this must not delay starting artificial respiration.

(ii) If the stomach contents are regurgitated, the casualty's head should be turrned to one side and his mouth cleaned out.

(iii) When natural breathing is restored, the casualty should be kept warm (but not overheated) with blankets, etc.

Suggested minimum requirements and additional provisions

Subject to the legal requirements:
It is suggested, as a guide, that the following items be kept in a clearly labelled first aid box or cupboard. The quantities indicated are recommended for establishments employing up to fifty persons.

1. A sufficient number (not less than twelve) of small sterilised unmedicated dressings for injured fingers.
2. A sufficient number (not less than six) of medium-sized sterilised unmedicated dressings for injured hands of feet.
3. A sufficient number (not less than six) of large sterilised unmedicated dressings for other injured parts.
4. A sufficient number (not less than twenty-four) of adhesive wound dressings of an approved type and of assorted sizes.
5. A sufficient number (not less than four) of triangular bandages of unbleached calico, the longest side of which should measure not less than 130 cm and each of the other sides not less than 92 cm.
6. A sufficient supply of adhesive plaster.
7. A sufficient supply of absorbent sterilised cotton wool in half-ounce packets.
8. A sufficient supply of approved eye ointment in a container of an approved type and size.
9. A sufficient number (not less than four) of sterilsed eye-pads in separate sealed packets.
10. A rubber bandage or pressure bandage.
11. Safety pins.

It is suggested that in additon to the above provisions, which cater primarily for cuts and heat burns, each laboratory first aid box should contain the following:

- Eye Irrigation bottle=--1/2 litre capacity
- Tablespoon
- Bottle of Common Salt
- Bottle of Magnesium Sulphate (Epsom Salts)
- Bottle of milk of Magnesia (Dose: Two tablespoonfuls)
- Bottle of Vinegar of 1% Acetic Acid

½ litre lotion bottle containing water, for first aid treatment of splashes in the eye.

The following remedies and antidotes for specific chemicals should be included in the box if these chemicals are being handled in the laboratory concerned:

Bromine, Formic Acid & Hydrofluoric Acid
(splashed on skin). A 350 ml bottle containing dilute ammonia solution (I volume 0.88 s.g. ammonia assed to 15 volumes of water).
Cyanides antidote to be taken when cyanides have been swallowed).
The following solutions must be made up and kept ready for immediate use-—

A. 158 g of ferrous sulphate crystals* (FeSO4. 7H2O) and 3 g of cirtic acid crystals* dissolved in a litre of distilled water (the solution must be regularly inspected and replaced if any deterioration occurs).
B. 60 g of anhydrous sodium carbonate (Naz Cos) disdolved in a liter of distilled water
50 ml of solution A is placed in a 175 ml wide,-neck bottle closed by a polythene-covered cork and labeled clearly "Cyanide Antidote A", 50 ml of solution B is similarly bottled and labeled " CYANIDE ANTIDOTE B ". Both bottles should bear the legend [1] Mix the whole contents of bottles "A" and "B" and swallow the mixture.'

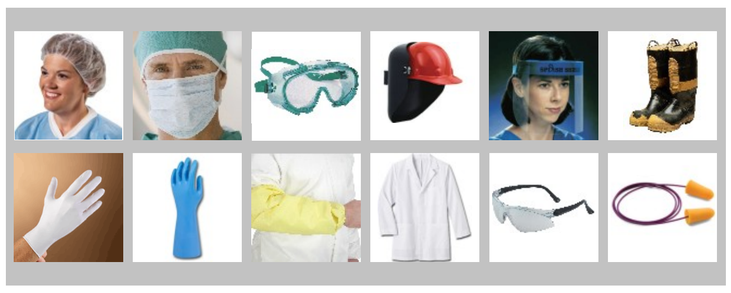
Hydrogen Cyanide And Nitriles
(inhaled by gassing casualties). Amyl nitrite capsules (3 minims). **Iodine** (after skin contact or ingestion). Sodium thiosulphate crystals in bottles for fresh preparation of 1 % solution in water. **Phosphorus** (skin burns). 350 ml bottle containing a 3% solution of copper sulphate in water. **Emetics**.

The response of different people to the various first aid methods used to induce vomiting is by no means uniform. A simple method is that of ticking the back of the throat with two fingers or a spoon. A useful and quickly available emetic is salt water (one tablespoonful of common salt in each cupful of tepid water) repeated until vomiting occurs.

It is emphasized that vomiting should never be induced in cases of unconsciousness or the ingestion of corrosive poisons such as strong acids or alkalis, or phenolic substances.

The information contained in this chart is for immediate reference for giving first aid by authorised - qualified first aiders. MSDS of the respective chemicals involved must be sent along with the casuality to the doctor.

*pharmaceutical grade



PPE - Personal protection equipments

Fisher brand glassware

Emergency contact name & tel no.

First aider.....
Nearest hospital.....
Nearest ambulance service.....
Nearest doctor..... Tel.....
Mobile .....

Person on premises trained to give artificial respiration.....
Person to whom accidents must be reported.....

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