

APPENDIX B

B 1: HAZARD WARNING SYMBOLS AND HAZARD DESIGNATIONS AND THEIR EXPLANATION (Applied for Chemicals in Schools)

1. Explosive substances (E)

These are substances which can be caused to explode by exposure to a flame or which are more sensitive to impact or friction than 1,3-Dinitrobenzen (e.g. picrates, organic peroxides). In particular they include substances with R-ratings R 1 - R 3 (see B 2), designation E.

When using and storing these substances, the S-provisions (S 15 - S 17) must be observed (see B 2).

2. Fire-inducing substances, Oxidizing (O)

These are substances which can have a strong exothermic reaction on coming into contact with other, particularly flammable substances or organic peroxides. They include in particular substances R 7 to R 9, designation O.

3. Highly flammable, easily flammable and flammable substances (F +, F)

In liquid form, highly flammable substances have an ignition point below 0°C and a boiling point of 35°C maximum. They are to be designated by the danger symbol F+ and the rating R 12.

Substances are easily flammable if they:

- a) can heat up and ignite at normal air temperature without energy supply,
- b) are easily ignited in solid state by short exposure to a source of flammation and continue to burn or glow after removal of the latter,
- c) ignite below 21°C in liquid state,
- d) ignite in gaseous state if mixed with air at 101,3 kPa and 20°C,
- e) develop easily flammable gases in dangerous quantities when in contact with water or damp air,
- f) ignite if brought into contact with air when in dustlike state.

These substances are to be designated with the danger symbol F and the rating R 11.

Flammable substances have in liquid form an ignition point of 21°C to 55°C and are to be designated with the rating R 10, no danger symbol.

When dealing with highly flammable, easily flammable and flammable liquids may only be heated using sealed electrical heating equipment which is not in itself a source of flammation. All substances must be heated in such a way that the dangerous vapours liberated by heating cannot escape into the atmosphere. This does not apply to fire-hazardous substances in small quantities for fire demonstrations.

The regulations laid down by the state fire authorities must be observed.

4. Toxic substances (T +, T, Xn)

Legislation applying to chemicals distinguishes three categories of toxicants:

- highly toxic substances (R 26 - R 28), danger symbol T+,
- toxic substances (R 23 - R 25), danger symbol T,
- less toxic substances (R 20 - R 22), danger symbol X_n.

Highly toxic substances are those which can cause grave acute or chronic health damage or death almost immediately if inhaled, swallowed or absorbed through the skin in small amounts.

Toxic substances are those which can cause considerable acute or chronic health damage or death if inhaled, swallowed or absorbed through the skin in small amounts.

Less toxic substances (noxious substances) are those which can cause restricted health damage if inhaled, swallowed or absorbed through the skin.

If highly toxic or toxic substances are produced in the course of an experiment (e.g. chlorine, hydrogen sulfide), these may only be produced in the quantities necessary for the experiment. In the case of volatile substances, the experiment must be conducted under a hood where the gas can be drawn off. Residue must be appropriately disposed of after the experiment and may on no account be stored. If the facilities for disposal are not available, the experiment may not be conducted.

Less toxic substances and preparations may be obtained without a permit. Less toxic substances are also those which contain a highly toxic or toxic substance at a level of concentration below that determined by law as the maximum for classification as noxious. Chlorine water, bromine water and hydrogen sulfide solution in a concentration of up to 1% may therefore be used in instruction.

5. Corrosives and irritants (C, X i)

Caustic or corrosive substances (R 34, R 35), designation C, are those which can destroy living materials by their action upon it. Substances are classed as irritants (R 36 - R 38), designation X_i, if they cause inflammation - without being corrosive - on direct, prolonged or repeated contact with the skin or mucous membranes. The relevant safety recommendations (S 22 - S 28) should be observed.

6. Carcinogenic, genotype or embryo-damaging, chronically harmful substances

Substances may not be used for instruction if they have a proven carcinogenic effect (R 45), if they cause hereditary damage (R 46) or embryo damage (R 47), or if they are chronically damaging (R 48), particularly those substances classed as unmistakably carcinogenic. Such substances must be removed from all school stocks. Storage is not permitted under any circumstances.

Further, substances for which there is a well-founded suspicion of carcinogenic potential (R 40) may only be used if corresponding safety precautions are taken and only in such cases where they cannot be replaced by less dangerous chemicals.

B 2: R-RATINGS AND S-PROVISIONS

Nature of special risks (R)

- R 1 Explosive when dry.
- R 2 Risk of explosion by shock, friction, fire or other sources of ignition.
- R 3 Extreme risk of explosion by shock, friction, fire or other sources of ignition.
- R 4 Forms very sensitive explosive metallic compounds.
- R 5 Heating may cause an explosion.
- R 6 Explosive with or without contact with air.
- R 7 May cause fire.
- R 8 Contact with combustible material may cause fire.
- R 9 Explosive when mixed with combustible material.
- R 10 Flammable.
- R 11 Highly flammable.
- R 12 Extremely flammable.
- R 13 Extremely flammable liquefied gas.
- R 14 Reacts violently with water.
- R 15 Contact with water liberates highly flammable gases.
- R 16 Explosive when mixed with oxidizing substances.
- R 17 Spontaneously flammable in air.
- R 18 In use, may form flammable/explosive vapour-air mixture.
- R 19 May form explosive peroxides.
- R 20 Harmful by inhalation.
- R 21 Harmful in contact with skin.
- R 22 Harmful if swallowed.
- R 23 Toxic by inhalation.
- R 24 Toxic in contact with skin.
- R 25 Toxic if swallowed.
- R 26 Very toxic by inhalation.
- R 27 Very toxic in contact with skin.
- R 28 Very toxic if swallowed.
- R 29 Contact with water liberates toxic gas.
- R 30 Can become highly flammable in use.
- R 31 Contact with acids liberates toxic gas.
- R 32 Contact with acids liberates very toxic gas.
- R 33 Danger of cumulative effects.
- R 34 Causes burns.
- R 35 Causes severe burns.
- R 36 Irritating to eyes.
- R 37 Irritating to respiratory system.
- R 38 Irritating to skin.
- R 39 Danger of very serious irreversible effects.
- R 40 Possible risks of irreversible effects.
- R 41 Danger of serious eye damage.
- R 42 May cause sensitization by inhalation.
- R 43 May cause sensitization by skin contact.
- R 44 Risk of explosion if heated by occlusion.
- R 45 May cause cancer.
- R 46 May cause hereditary damage.
- R 47 May cause embryo damage.
- R 48 Danger of chronic damage.

Safety advice (S)

- S 1 Keep locked up.
- S 2 Keep out of reach of children.
- S 3 Keep in a cool place.
- S 4 Keep away from living quarters.
- S 5 Keep contents under (appropriate liquid to be specified by the manufacturer).
- S 6 Keep under (inert gas to be specified by the manufacturer).
- S 7 Keep container tightly closed.
- S 8 Keep container dry.
- S 9 Keep container in a well-ventilated place.
- S 10 Keep contents wet.
- S 11 Avoid contact with air.
- S 12 Do not keep the container sealed.
- S 13 Keep away from food, drink and animal feeding stuffs.
- S 14 Keep away from (incompatible materials to be indicated by the manufacturer).
- S 15 Keep away from heat.
- S 16 Keep away from sources of ignition - No smoking.
- S 17 Keep away from combustible materials.
- S 18 Handle and open container with care.
- S 20 When using do not eat or drink.
- S 21 When using do not smoke.
- S 22 Do not inhale dust.
- S 23 Do not inhale gas/fumes/vapour/spray.
- S 24 Avoid contact with skin.
- S 25 Avoid contact with eyes.
- S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S 27 Take off immediately all contaminated clothing.
- S 28 After contact with skin, wash immediately with plenty of (to be specified by the manufacturer).
- S 29 Do not empty into drains.
- S 30 Never add water to this product.
- S 31 Keep away from explosive materials.
- S 33 Take precautionary measures against static discharges.
- S 34 Avoid shock and friction.
- S 35 This material and its container must be disposed of in a safe way.
- S 36 Wear suitable protective clothing.
- S 37 Wear suitable gloves.
- S 38 In case of insufficient ventilation, wear suitable respiratory equipment.
- S 39 Wear eye/face protection.
- S 40 To clean the floor and all objects contaminated by this material, use (to be specified by the manufacturer).
- S 41 In case of fire and/or explosion do not breathe fumes.
- S 42 During fumigation/spraying wear suitable respiratory equipment.
- S 43 In case of fire, use (indicate in space the precise type of fire-fighting equipment. If water increases the risk, add - Never use water).
- S 44 If you feel unwell, seek medical advice (show the label where possible).
- S 45 In case of accident or if you feel unwell, seek medical advice (show the label where possible).