

CHEMICAL WORKS.

PART I

1. Application.- This schedule shall apply to all manufacture and processes incidental thereto carried on in chemical works.
2. Definitions.- For the purpose of this schedule -
 - (a) "chemical works" means any factory or such parts of any factory as are listed in appendix 'A' to this schedule;
 - (b) "efficient exhaust draught" means localised ventilation effected by mechanical or other means for the removal of gas, vapour, fume or dust to prevent it from escaping into the air of any place in which work is carried on;
 - (c) "bleaching powder" means the bleaching powder commonly called chloride of lime;
 - (d) "chlorate" means chlorate or perchlorate;
 - (e) "caustic" means hydroxide of potassium or sodium;
 - (f) "chrome process" means the manufacture of chromate or bichromate of potassium or sodium, or the manipulation, movement or other treatment of these substances;
 - (g) "nitro or amino process" means the manufacture of nitro or amino derivatives of phenol and of benzene or its homologues, and the making of explosives with the use of any of these substances;
 - (h) the term 'permit to work' system means the compliance with the procedures laid down under para 20 of Part II;
 - (i) "toxic substances" means all those substances which when they enter into the human body, through inhalation or ingestion or absorption through skin, in sufficient quantities cause fatality or exert serious affliction of health, or chronic harmful effects on the health of persons exposed to it due to its inherent chemical or biological effects. In respect of substances whose TLV is specified in Rule 123-A, exceeding the concentration specified therein would make the substance toxic;
 - (j) "emergency" means a situation or condition leading to a circumstance or set of circumstances in which there is danger to the life or health of persons or which could result in big fire or explosion or pollution to the work and outside environment, affecting the workers or neighbourhood in a serious manner, demanding immediate action;
 - (k) "dangerous chemical reactions" means high speed reactions, runaway reactions, delayed reactions, etc. and are characterised by evolution of large quantities of heat, intense release of toxic or flammable gases or vapours, sudden pressure build-up etc.;
 - (l) "manipulation" means mixing, blending, filling, emptying, grinding, sieving, drying, packing, sweeping, handling, using, etc.;
 - (m) "approved personal protective equipment" means items of personal protective equipment conforming to the relevant ISI specifications or in the absence of it, personal protective equipment approved by the Chief Inspector of Factories;
 - (n) "appropriate personal protective equipment" means that when the protective equipment is used by the worker, he shall have no risk to his life or health or body; and

- (o) “confined space” means any space by reason of its construction as well as in relation to the nature of the work carried therein and where hazards to the persons entering into or working inside exist or are likely to develop during working.

PART II General Requirements

Applying to all the works in Appendix `A`

1. Housekeeping.-

- a. Any spillage of materials shall be cleaned up before further processing.
- b. Floors, platforms, stairways, passages and gangways shall be free of any obstructions.
- c. There shall be provided easy means of access to all parts of the parts of the plant to facilitate cleaning.

2. Improper use of chemicals.- No chemicals or solvents or empty containers containing chemicals or solvents shall be permitted to be used by workers for any purpose other than in the processes for which they are supplied.

3. Prohibition on the use of food, etc.- No food, drink, tobacco, pan or any edible item shall be stored or heated or consumed on or near any part of the plant or equipment.

4. Cautionary Notices and Instructions.-

- (a) Cautionary notices in a language understood by the majority of workers shall be prominently displayed in all hazardous areas drawing the attention of all workers about the hazards to health, hazards involving fire and explosion and any other hazard such as consequences of testing of material or substances used in the process or using any contaminated container for drinking or eating, to which the workers' attention should be drawn for ensuring their safety and health.
- (b) In addition to the above cautionary notice, arrangement shall be made to instruct and educate all the workers including illiterate workers about the hazards in the process including the specific hazards to which they may be exposed to, in the normal course of their work. Such instructions and education should also deal with the hazards involved in unauthorised and unsafe practices including the properties of substances used in the process under normal conditions as well as abnormal conditions and the precautions to be observed against each and every hazard. Further, an undertaking from the workers shall be obtained within 1 month of their employment and for old workers employed, within one month of coming into operation of the rules, to the effect that they have read the contents of the cautionary notices and instructions, understood them and would abide by them. The training and instructions to all workers and all supervisory personnel shall include the significance of different types of symbols and colours used on the labels stuck or painted on the various types of containers and pipe lines.

5. Evaluation and provision of safeguards before the commencement of process.-
 - a. Before commencing any process or any experimental work, or any new manufacture covered under Appendix 'A', the occupier shall take all possible steps to ascertain definitely all the hazards involved both from the actual operations and the chemical reactions including the dangerous chemical reactions. The properties of the raw materials used, the final products to be made and any by-products derived during manufacture, shall be carefully studied and provisions shall be made for dealing with any hazards including effects on workers, which may occur during manufacture.
 - b. Information in writing giving details of the process, its hazards and the steps taken or proposed to be taken from the design stage to disposal stage for ensuring the safety as in sub-para (a) above should be sent to the Chief Inspector-cum-Facilitator at the earliest but in no case less than 15 days before commencing manufacture, handling, or storage of any of items covered under Appendix 'A', whether on experimental basis, or as pilot plant or as trial production, or as large scale manufacture.
 - c. The design, construction, installation, operation, maintenance and disposal of the buildings, plant and facilities shall take into consideration effective safeguards against all the safety and health hazards so evaluated.
 - d. The requirements under the sub-para (a) to (c) shall not act in lieu of or in derogation to, any other provisions contained in any Act governing the work.
6. Authorised entry.- Authorised persons only shall be permitted to enter any section of the factory or plant where any dangerous operations or processes are being carried on or where dangerous chemical reactions are taking place or where hazardous chemicals are stored.
7. Examination of instruments and safety devices.-
 - a. All instruments and safety devices used in the process shall be tested before taking into use and after carrying out any repair to them and examined once in a month, by a competent person. Records of such tests and examinations shall be maintained in a register.
 - b. All instruments and safety devices used in the process shall be operated daily or as often as it is necessary, to ensure its effective and efficient working at all times.
8. Electrical installations.- All electrical installations used in the process covered in Appendix 'A' shall be of an appropriate type to ensure safety against the hazard prevalent in that area such as suitability against dust, dampness, corrosion, flammability and explosivity etc. and shall conform to the relevant ISI specifications governing their construction and use for that area.
9. Handling and storage of chemicals.-
 - a. The containers for handling and storage of chemicals shall be of adequate strength taking into consideration the hazardous nature of the contents. They shall also be provided with adequate labelling and colour coding arrangements to enable

identification of the containers and their contents indicating the hazards and safe handling methods and shall conform to the respective ISI standards. The instructions given in the label shall be strictly adhered to. Damaged containers shall be handled only under supervision of a knowledgeable and responsible person and spillage shall be rendered innocuous in a safe manner using appropriate means.

- b. The arrangements for the storage of chemicals including charging of chemicals in reaction vessels and containers shall be such as to prevent any risk of fire or explosion or formation of toxic concentration of substances above the limits specified in Rule 128.
 - c. Without prejudice to the generality of the requirements in sub- para (b) above, the arrangements shall have suitable ventilation facilities and shall enable the maintenance of safe levels in vessels and containers. Such arrangements shall also take into consideration, the type of flooring and the capacity of flooring and the compatibility requirements of substances with other chemicals stored nearby.
 - d.
 - (i) Storage of chemicals and intermediate products, which are highly unstable or reactive or explosive shall be limited to the quantities required for two months use.
 - (ii) Whenever the quantities laid down in the above clause(i) are to be exceeded, the permission of the Chief Inspector-cum-Facilitator shall be obtained.
 - (iii) Notwithstanding anything contained in clause (i) and (ii) above, the Chief Inspector-cum-Facilitator of Factories may direct any factory carrying out processes covered in Appendix 'A' to further limit the storage of hazardous substances to quantities less than two months on considerations of safety.
 - e. Standby arrangements equal to the biggest container shall always be available to transfer the toxic substances quickly into the standby storage facility if any defect develops in any of the container resulting in the release of toxic substances.
 - f. Any storage facility constructed using non-metallic material such as Fibreglass Reinforced Plastics (FRP), all glass vessels etc., shall have adequate strength to withstand the stress, if any, exerted by the contents and shall be properly anchored. Working platforms, access ladders, pipelines etc used in such storage facility shall not have any support on the structure of the storage facility and shall be independently supported.
10. Facility for isolation.- The plant and equipment shall be so constructed and maintained as to enable quick isolation of plant or part of plant or equipment, with appropriate indication. One copy of the layout plan indicating the isolation facilities shall always be available with the security personnel, the maintenance and the health and safety personnel and these isolation facilities shall be checked for its effectiveness once in a month.
11. Personal protective equipment.-

- (a) All workers exposed to the hazards in the processes covered by this Schedule shall be provided with appropriate and approved type of personal protective equipment. Such equipment shall be in a clean, sterile and hygienic condition before issue.
- (b) The occupier shall arrange to inform, educate and supervise all the workers in the use of personal protective equipment while carrying out the job.
- (c) As regards any doubt regarding the appropriateness of any personal protective equipment, the decision of the Chief Inspector-cum-Facilitator will be final.

12. Alarm Systems.-

- (a) Suitable and effective alarm systems giving audible and visible indications, shall be installed at the control room as well as in all strategic locations where process control arrangements are available so as to enable corrective action to be taken before the operational parameters exceed the predetermined safe levels or lead to conditions conducive for an outbreak of fire or explosion to occur. Such alarm systems shall be checked daily and tested every month at least once to ensure its performance efficiency at all times.
- (b) The Chief Inspector-cum-Facilitator of Factories may direct such system to be installed in case of plants or processes where toxic materials are being used and spillage or leakage of which may cause wide spread poisoning in or around the plant.

13. Control of escape of substances into the work atmosphere.-

- (a) Effective arrangements such as, enclosure, or by pass, or efficient exhaust draught, maintenance of negative pressure etc., shall be provided in all plants, containers, vessels, sewers, drains, flues, ducts, culverts, and buried pipes and equipment, to control the escape and spread of substances which are likely to give rise to fire or explosion or toxic hazards during normal working and in the event of accident or emergency.
- (b) In the event of the failure of the arrangements for control resulting in the escape of substances in the work atmosphere immediate steps shall be taken to control the process in such a manner, that further escape is brought down to the safe level.
- (c) The substances that would have escaped into the work atmosphere before taking immediate steps as required in sub-para (b), shall be rendered innocuous by diluting with air or water or any other suitable agent or by suitably treating the substances.

14. Control of dangerous chemical reactions.- Suitable provision, such as automatic and or remote control arrangements, shall be made for controlling the effects of 'dangerous chemical reactions'. In the event of failure of control arrangements automatic flooding or blanketing or other effective arrangements shall come into operation.

15. Testing, examination and repair of plant & equipment.-

- (a) All parts of plant, equipment and machinery used in the process which in the likely event of their failure may give rise to an emergent situation shall be tested by a competent person before commencing process and retested at an interval of two years or after carrying out repairs to it. The competent person shall identify the parts of the plant, equipment and machinery required to be tested as aforesaid and evolve a suitable testing procedures. In

carrying out the test mentioned above in respect of pressure vessels or reaction vessels the following precautions shall be observed, namely -

- (i) before the test is carried out, each vessel shall be thoroughly cleaned and examined externally, and as far as practicable, internally also for surface defects, corrosion and foreign matters. During the process of cleaning and removal of sludge, if any, all due precautions shall be taken against fire or explosion, if such sludge is of pyrophoric nature or contains spontaneously combustible chemicals;
 - (ii) as soon as the test is completed, the vessel shall be thoroughly dried internally and shall be clearly stamped with the marks and figures indicating the person by whom testing has been done, and the date of test; and
 - (iii) any vessel which fails to pass the test or which for any other reason is found to be unsafe for use shall be destroyed or rendered unusable under intimation to the Chief **Inspector-cum-Facilitator**.
- (b) All parts of plant, equipment, machinery which is the likely event of failure may give rise to an emergent situation shall be examined once in a month by the competent person.
 - (c) records of testing and examination referred to in paragraphs (a) and (b) shall be maintained as long as that part of the plant, equipment and machinery are in use.
 - (d) All repair work including alteration, modification and addition to be carried out to the plant, equipment and machinery shall be done under the supervision of a responsible person who shall evolve a procedure to ensure safety and health of persons doing the work. When repairs or modification is done on pipelines, and joints are required to be welded, butt welding of joints shall be preferred. Wherever necessary, the responsible person shall regulate the aforesaid work through a 'Permit to work' system'.

16. Staging.-

- a. All staging that is erected for the purpose of maintenance work or repair work or for work connected with entry into confined spaces and used in the processes included in Appendix 'A', shall be stable, rigid and constructed out of substantial material of adequate strength. Such staging shall conform to the respective Indian Standard specifications.
- b. Staging shall not be erected over any closed or open vessel unless the vessel is so constructed and ventilated to prevent exposure of persons working on the stages.
- c. All the staging constructed for the purpose of this para shall have appropriate access which are safe and shall be fitted with proper hand rails to a height of one metre and toe board.

- #### 17. Seating Arrangements.-
- The seating arrangements provided for the operating personnel working in processes covered in Appendix 'A' shall be located in a safe manner as to prevent the risk of exposure to toxic, flammable and explosive substances evolved in the work environment in the course of manufacture or repair or maintenance, either due to failure of plant and equipment or due to the substances which are under pressure, escaping into the atmosphere.

18. Entry into or work in confined spaces.-

- (a) The occupier of every factory to which the provisions of this schedule apply, shall ensure the observance of the following precautions before permitting any person to enter or work inside the confined spaces -
- (i) identify all confined spaces and the nature of hazards that are encountered in such spaces, normally or abnormally, and arrange to develop the most appropriate safeguards for ensuring the safety and health of persons entering into or working inside, the confined spaces;
 - (ii) regulate the entry or work inside the confined spaces through a 'permit to work system' which should include the safeguards so developed as required under sub-clause (i) above;
 - (iii) before testing the confined space for entry into or work, the place shall be rendered safe by washing or cleaning with neutralising agents; or purging with steam or inert gases and making adequate forced ventilation arrangements or such measure which will render the confined space safe;
 - (iv) shall arrange to carry out such tests as are necessary for the purpose by a competent person and ensure that the confined space is safe for the persons to enter or work. Such testing shall be carried out as often as is necessary during the course of work to ensure its continued safety;
 - (v) shall arrange to educate and train the personnel who would be required to work in confined spaces about the hazards involved in the work. He shall also keep in readiness the appropriate and approved personal protective equipment including arrangements for, rescue resurrection and first aid, and shall arrange supervision of the work at all times by a responsible and knowledgeable person.
- (b) The manager shall maintain a log of all entry into or work in, confined spaces and such record shall contain the details of persons assigned for the work, the location of the work and such other details that would have a bearing on the log book so maintained shall be retained as long as the concerned workers are in service and produces to the **Inspector-cum-Facilitator** when demanded.

19. Maintenance work etc.-

- (a) All the work connected with the maintenance of plants and equipment including cleaning of empty containers which have held hazardous substances used in the processes covered in this Schedule, shall be carried out under 'permit to work system' employing trained personnel and under the supervision of responsible person, having knowledge of the hazards and precautions required to deal with them.
- (b) Maintenance work shall be carried out in such a manner that there is no risk to persons in the vicinity or to persons who pass by. If necessary, the place of such work shall be cordoned off or the presence of unconnected persons effectively controlled.

20. Permit to work system.- The permit to work system shall inter-alia include the observance of the following precautions while carrying out any specified work to be subjected to the permit to work system-

- (a) all work subject to the permit to work system shall be carried out under the supervision of a knowledgeable and responsible person;
- (b) all parts of plant or machinery or equipment on which permit to work system is carried out, shall remain isolated from other parts throughout the period of permit to work and the place of work including the parts of plant, machinery shall be rendered safe by cleaning, purging, washing, etc.;
- (c) all work subject to the permit to work system shall have predetermined work procedures which integrate safety with the work. Such procedures shall be reviewed whenever any change occurs in material or equipment so that continued safety is ensured;
- (d) persons who are assigned to carry out the permit to work system shall be physically fit in all respects taking into consideration the demands and nature, of the work before entering into the confined space. Such person shall be adequately informed about the correct work procedures as well as the precautions to be observed while carrying out the permit to work system;
- (e) adequate rescue arrangements wherever considered necessary and adequate first aid, rescue and resuscitation arrangements shall be available in good working condition near the place of work while carrying out the permit to work system, for use in emergency;
- (f) appropriate and approved personal protective equipment shall be used while carrying out the 'permit to work system';
- (g) after completion of work subject to the 'permit to work system' the person responsible shall remove all the equipment and tools and restore to the original condition so as to prevent any danger while carrying out regular process.

21. Safety sampling personnel.- The occupier shall ensure the safety of persons assigned for collecting samples by instructing them on the safe procedures. Such personnel shall be provided with proper and approved personal protective equipment, if required.

22. Ventilation.- Adequate ventilation arrangements shall be provided and maintained at all times in the process area where dangerous or toxic or flammable or explosive substances could be evolved. These arrangements shall ensure that concentrations, which are either harmful or could result in explosion, are not permitted to be built up in the work environment.

23. Procedures for meeting emergencies.-

- (1) The occupier of every factory carrying out the works covered in Appendix 'A', shall arrange to identify all types of possible emergencies that could occur in the processes

during the course of work or while carrying out maintenance work or repair work. The emergencies so identified shall be reviewed every year.

- (2) The occupier shall formulate a detailed plan to meet all such identified emergencies including arrangements for summoning outside help for rescue and fire fighting arrangements for making available **urgent medical facilities**.
- (3) The occupier shall send the list of emergencies and the details of procedures and plans formulated to meet the emergencies, to the Chief Inspector-cum-Facilitator of Factories.
- (4) The occupier shall arrange to install distinctive and recognisable warning arrangements to caution all persons inside the plant as well as the neighbouring community, if necessary, to enable evacuation of persons and to enable the observance of emergency procedures by the persons who are assigned emergency duties. All concerned must be well informed about the warning arrangements and their meaning. The arrangements must be checked for its effectiveness every month.
- (5) Alternate power supply arrangements shall be made and interlocked with the normal power supply system so as to ensure constant supply of power to the facilities and equipment meant for compliance with requirements of Paragraphs 10, 11, 12, 13, 14, 18, 22, and this paragraph of Part II, Part III, Part IV and Part V of this Schedule.
- (6) The occupier shall arrange to suspend the further process work in a place where emergency is established and shall forthwith evacuate all persons in that area except workers who have been assigned emergency duties.
- (7) All the employees of the factory shall be trained about the action to be taken by them including evacuation procedures during emergencies.
- (8) All emergency procedures must be rehearsed every three months and deficiencies, if any, in the achievement of the objectives shall suitably be corrected.
- (9) The occupier shall arrange to have ten percent of the workers trained in the use of **First Aid Fire Fighting appliances** and in the rendering of specific hazards of the particular process.
- (10) The occupier shall furnish immediately on request the specific chemical identity of the hazardous substance to the treating physician where the information is needed to administer proper emergency or first-aid treatment to exposed persons.

24. Danger due to effluents.-

- (1) Adequate precautions shall be taken to prevent the mixing of effluents from different processes and operations which may cause dangerous or poisonous gases to be evolved.
- (2) Effluents which contain or give rise in the presence of other effluents to poisonous gases shall be provided with independent drainage systems to ensure that they may be trapped and rendered safe.

PART III

Fire and Explosion Risks

1. Sources of ignition including lighting installation.-
 - (1) No internal combustion engine and no electric motor or other electrical equipment, and fittings and fixtures capable of generating sparks or otherwise causing combustion or any other source of ignition or any naked light shall be installed or permitted to be in the process area where there could be fire and explosion hazards.
 - (2) All hot exhaust pipes shall be installed outside a building and other hot pipes or hot surface or surfaces likely to become hot shall be suitably protected.
 - (3) The classification of work areas in terms of its hazard potential and the selection of electrical equipment or other equipment that could constitute a source of ignition shall be in accordance with the respective Indian Standard.
 - (4) Where a flammable atmosphere may be prevalent or could occur, the soles of footwear worn by workers shall have no metal on them, and the wheels of trucks or conveyors shall be conductive type.
 - (5) All tools and appliances used for work in this area shall be of non-sparking type.
 - (6) Smoking in process areas where there are risks of fire and explosion shall be prohibited, and warning notices in the language understood by majority of workers shall be posted in the factory prohibiting smoking into specified areas.

2. Static Electricity.-
 - (1) All machinery and plant, particularly, pipe lines and belt drives, on which static charge is likely to accumulate, shall be effectively earthed. Receptacles for flammable liquids shall have metallic connections to the earthed supply tanks to prevent static sparking. Where necessary, humidity shall be regulated.
 - (2) Mobile tanker wagons shall be earthed during filling and discharge, and precautions shall be taken to ensure that earthing is effective before such filling or discharge take place.
3. Lightning protection.- Lightning protection arrangement shall be fitted where necessary, and shall be maintained.
4. Process heating.- The method of providing heat for a process likely to result in fire and explosion shall be as safe as possible and where the use of naked flame is necessary, the plant shall be so constructed as to prevent any escaping flammable gas, vapour, or dust coming into contact with the flame, or exhaust gases, or other sources likely to cause ignition. Wherever possible, the heating arrangement shall be automatically controlled at a pre-determined temperature below the danger temperature.

5. Leakage of flammable liquids.-
 - (1) Provision shall be made to confine by means of bund walls, dykes, sumps etc. possible leakages from storage vessels containing flammable liquids.
 - (2) Waste material in contact with flammable substances shall be disposed off suitably under the supervision of knowledgeable and responsible person.

- (3) Adequate and suitable fire-fighting appliances shall be installed in the vicinity of such vessels.
6. Safety valves.- Every still and every closed vessel which gas is evolved or into which gas is passed, and in which the pressure is liable to rise above the atmospheric pressure, shall have attached to it a pressure gauge, and a proper safety valve or other equally efficient means to relieve the pressure. These appliances shall be maintained in good condition.
7. Installation of pipe line etc.- All pipelines carrying flammable or explosive substances shall be protected from mechanical damage and shall be examined by a responsible person once a week to detect any deterioration or defects, or accumulation of flammable or explosive substances, and record kept of any defects found and repairs made.
8. Fire fighting systems.-
- (1) Every factory employing 500 or more persons and carrying out processes listed in Appendix 'A' shall provide -
- (a) Trained and responsible fire fighting squad so as to effectively handle the fire fighting and life saving equipment in the event of fire or other emergency. Number of persons in this squad will necessarily depend upon the size of risk involved, but in no case shall be less than 8 such trained persons to be available at any time. The squad shall consist of watch & ward personnel, fire pump man and departmental supervisors and operators trained in the operation of fire & emergency services.
- (b) Squad leaders shall preferably be trained in a recognised government institution and their usefulness enhanced by providing residence on the premises.
- (c) Squad personnel shall be provided with clothing and equipment including helmets, boots and belts.
- (2) A muster roll showing the duties allocated to each member of the squad shall be prepared and copies supplied to each leader as well as displayed in prominent places so as to be easily available for reference in case of emergency.
- (3) The pump man shall be thoroughly conversant with the location of all appliances. He shall be responsible for maintaining all fire fighting equipment in proper working order. Any defect coming to his notice shall be immediately be brought to the notice of squad leader.
- (4) As far as is practicable, the fire pump room and the main gate(s) of the factory be connected to all manufacturing or storing areas through telephone inter lined and placed in a convenient location near such areas.

PART IV

Risks of Toxic Substances

1. Leakage.-

- (1) All plants shall be so designed and constructed as to prevent the escape of toxic substance. Where necessary, separate buildings, rooms, or protective structures shall be used for the dangerous stages of the process and buildings shall be so designed as to localise any escape of toxic substances.
 - (2) Catch pits, bund walls, dykes, or other suitable safeguards shall be provided to restrict the serious effects of such leakages. Catch pits shall be placed below joints in pipelines where there is danger involved to maintenance and other workers from such leakage.
2. Drainage.- Adequate drainage shall be provided and shall lead to collection tanks specifically provided for this purpose wherein deleterious material shall be neutralised, treated or otherwise rendered safe before it is discharged into public drains or sewers.
3. Covering of vessels.-
- (1) Every fixed vessel or structure containing any toxic substance and not so covered as to eliminate all reasonable risk of accidental contact of any portion of the body of a worker, shall be so constructed as to avoid physical contact.
 - (2) Such vessel shall, unless its edge is at least 90 centimetres above the adjoining ground or platform, be securely fenced to a height of at least 90 centimetres above such adjoining ground or platform.
 - (3) Where such vessels adjoin and the space between them, clear of any surrounding brick or other work is either less than 45centimetres in width or is 45 or more centimetres in width, but is not securely fenced on both sides to a height of at least 90 centimetres, secure barriers shall be so placed as to prevent passage between them :

Provided that sub-paragraph (2) of this paragraph shall not apply to -

- (a) saturators used in the manufacture of sulphate of ammonia; and
- (b) that part of the sides of brine evaporating pans which require raking, drawing or filling.

4. Continuous exhaust arrangement.-

- (1) Any process evolving toxic vapour, gas, fume and substance shall have efficient continuous exhaust draught. Such arrangement shall be interlocked in the process control wherever possible.
- (2) In the event of failure of continuous exhaust arrangement means shall be provided to automatically stop the process.

5. Work Bench.- All the work benches used in the processes involving the manipulation of toxic substances, shall be graded properly and shall be made of smooth impervious surface which shall be washed daily after the completion of work.

6. Waste disposal.-

- (1) There shall be provided a suitable receptacle made of non-absorbable material with a tightly fitting cover for depositing waste material soiled with toxic substances and the

contents of such receptacle shall be destroyed by burning or using other suitable methods under the supervision of a responsible person.

- (2) During the course of manufacture, whenever any batch or intermediate products having toxicity is rejected on considerations of quality, sufficient precautions shall be taken to render them innocuous or otherwise treat them or inactivate them, before disposal.
- (3) The empty containers of toxic substances shall be cleaned thoroughly before disposal under the supervision of a responsible person.

PART V

Special Provisions

1. Special precautions for Nitro or Amino Processes.-

- (1) Unless the crystallised nitro or amino substances or any of its liquor is broken or agitated in a completely enclosed process so as not to give rise to dust or fume, such process shall be carried on under an efficient exhaust draught or by adopting any other suitable means in such a manner as to prevent the escape of dust or fume in the working atmosphere.
- (2) No part of the plant or equipment or implements which was in contact with nitro or amino compounds shall be repaired, or handled unless they have been emptied and thoroughly cleaned and decontaminated.
- (3) Filling of containers with nitro or amino compounds shall be done only by using a suitable scoop to avoid physical contact and the drying of the containers in the stove shall be done in such a manner that the hot and contaminated air from the stove is not drawn into the work room.
- (4) Processes involving the steaming into or around any vessel containing nitro or amino compounds or its raw materials shall be carried out in such a manner that the steam or vapour is effectively prevented to be blown back into the working atmosphere.
- (5) Suitable antidotes such as methylene blue injections shall always be available at designated places of work for use during emergency involving the poisoning with nitro or amino compounds.

2. Special precautions for 'chrome processes'.-

- (1) Grinding and sieving of raw materials in chrome processes shall be carried on in such a manner and under such condition as to secure effective separation from any other processes and under an efficient exhaust draught.
- (2) There shall be washing facilities located very near to places where wet chrome processes such as leaching, acidification, sulphate settling, evaporation, crystallisation, centrifugation or packing are carried out, to enable quick washing of affected parts of body with running water.
- (3) Weekly inspection of hand and feet of all persons employed in chrome process shall be done by a qualified nurse and record of such inspections shall be maintained in a form approved by the Chief **Inspector-cum-Facilitator** of Factories.
- (4) There shall be always available at designated places of work suitable ointment such as glycerine, vaseline, etc. and water proof plaster in a separate box readily accessible to the workers so as to protect against perforation of nasal septum.

3. Special precautions for processes carried out in all glass vessels.-

- (1) Processes and chemical reactions such as manufacture of vinyl chloride, benzyl chloride etc. which are required to be carried out in all glass vessels shall have suitable means like substantial wire mesh covering to protect persons working nearby in the event of breakage of glass vessel.
- (2) Any spillage or emission of vapour from the all glass vessel due to breakage, shall be immediately inactivated or rendered innocuous by suitable means such as dilution with water or suitable solvents so as to avoid the risks of fire or explosion or health hazards.

4. Special precautions for processes involving chlorate manufacture.-

- (1) Crystallisation, grinding or packing of chlorate shall not be done in a place used for any other purpose and such places shall have hard, smooth and impervious surface made of non-combustible material. The place shall be thoroughly cleaned daily.
- (2) The personal protective equipment likes overall, etc. provided for the chlorate workers shall not be taken from the place of work and they shall be thoroughly cleaned daily.
- (3) Adequate quantity of water shall be available near the place of chlorate process for use during fire emergency.
- (4) Wooden vessels shall not be used for the crystallisation of chlorate or to contain crystallised ground chlorate.

5. Special precautions in the use of plant and equipment made from reinforced plastics.-

- (1) All plant and equipment shall conform to appropriate Indian or any other National Standard.
- (2) Care shall be taken during storage, transport, handling and installation of plant and equipment to avoid accidental damage.
- (3) All plant and equipment shall be installed in such a way as to ensure that loads are distributed as intended in design or as per the recommendations of the manufacture.
- (4) All pipe work shall be supported so that total loads local to the branches on the vessel or tank do not exceed their design values.
- (5) After erection all plant and equipment shall be subjected to a pressure test followed by a thorough examination by a competent person. The test and examination shall be as per relevant Standard. A certificate of test and examination by a competent person shall be obtained and kept available at site.
- (6) All plant and equipment shall be subjected to periodical test and examination and record maintained as per Paragraph 15 in Part II of this Schedule.
- (7) Plant and equipment during their use shall not be subjected to over filling or over loading beyond rated capacity.

PART VI Medical Requirements

1. Decontamination facilities.- In all places where toxic substances are used in processes listed in Appendix `A' the following provisions shall be made to meet an emergency:
 - (a) fully equipped first aid box;
 - (b) readily accessible means of drenching with water persons, parts of body of persons, and clothing of persons who have been contaminated with such toxic and corrosive substances, and such means shall be as shown in the Table below :

No. of persons employed at any time	No. of drenching showers
Upto 50 persons	2
Between 51 to 100	3
101 to 200	3 + 1 for every 50 persons thereafter
201 to 400	5 + 1 for every 100 persons thereafter
401 and above	7 + 1 for every 200 persons thereafter

(c) a sufficient number of eye wash bottles filled with distilled water or suitable liquid, kept in boxes or cupboards conveniently situated and clearly indicated by a distinctive sign which shall be visible at all times.

2. Occupational health centre.- In all the factories carrying out processes covered in Appendix 'A' there shall be provided and maintained in good order an occupational health centre with facilities as per scale laid down hereunder

(1) For factories employing upto workers -

(a) the services of a qualified medical practitioner hereinafter known as Factory Medical Officer, available on a retainership basis, in his notified clinic near to the factory for seeking medical help during emergency. He will also carry out the pre-employment and periodical medical examinations as stipulated in paragraph 4 of this Part.

(b) A minimum of five persons trained in first aid procedures, amongst whom at least one shall always be available during the working period.

(c) A fully equipped first aid box.

(2) For factories employing 51 to 200 workers -

(a) The occupational health centre shall have a room having a minimum floor area of 15 sq.m., with floors and walls made of smooth, hard and impervious surface and shall be adequately illuminated, ventilated and equipped.

(b) A part-time Factory Medical Officer will be in over all charge of the Centre who shall visit the factory minimum twice in a week and whose services shall be readily available during emergencies.

(c) There shall be one qualified and trained dresser-cum-compounder on duty throughout the working period.

(d) A fully equipped first aid box.

(3) For factories employing above 200 workers -

- (a) There shall be one full-time Factory Medical Officer for factories employing upto 500 workers and one more medical officer for every 1000 workers or part thereof.
- (b) The occupational health centre in this case shall have a minimum of 2 rooms each having a minimum floor area of 15 sq.m. with floors and walls made of smooth, hard and impervious surface and shall be adequately illuminated, ventilated and equipped.
- (c) There shall be one trained nurse, one dresser-cum-compounder and one sweeper-cum-ward boy throughout the working period.
- (d) **The Occupational Health Centre** in this case shall be suitably equipped to manage medical emergencies.

3. Ambulance van.-

- (1) In every factory carrying out processes covered in Appendix 'A', there shall be provided and maintained in good condition, a suitably constructed and fully equipped ambulance van as per Appendix 'C' manned by a full-time driver-cum-mechanic and a helper, trained in first aid for the purposes of transportation of serious cases of accidents or sickness unless arrangements for procuring such facility at short notice during emergencies have been made with the nearby hospital or other places. The ambulance van shall not be used for any purpose other than the purpose stipulated herein and will always be available near the Occupational Health Centre.
- (2) The relaxation to procure Ambulance Van from nearby places provided for in sub-para (1) above will not be applicable to factories employing more than 500 workers.

4. Medical examination.-

- (1) Workers employed in processes covered in Appendix 'A' shall be medically examined by a Factory Medical Officer in the following manner -
 - (a) Once before employment, to ascertain physical suitability of the person to do the particular job;
 - (b) Once in a period of 6 months, to ascertain the health status of the worker, and
 - (c) The details of pre-employment and periodical medical examinations carried out as aforesaid shall be recorded in the prescribed form.
- (2) Any finding of the Factory Medical Officer revealing any abnormality or unsuitability of any person employed in the process shall immediately be reported to the ~~Certifying Surgeon~~ **Medical Officer** who shall in turn, examine the concerned workers and communicate his findings within 30 days. If the ~~Certifying Surgeon~~ **Medical Officer** is of the opinion that the person so examined is required to be suspended from the process for health protection he will direct the occupier accordingly, who shall not employ the said worker in the same process. However, the person so suspended from the process shall be provided with alternate placement facilities unless he is fully incapacitated in the opinion of the ~~Certifying Surgeon~~ **Medical Officer**, in which case the person affected shall be suitably rehabilitated :

Provided that the ~~Certifying Surgeon~~ **Medical Officer** on his own may examine any other worker whom he feels necessary to be examined for ascertaining the suitability

of his employment in the process covered in Appendix 'A' or for ascertaining the health status of any other worker and his opinion shall be final.

- (3) No person shall be newly appointed without the Certificate of Fitness granted by the **Factory Medical Officer**. If the **Factory Medical Officer** declares a person unfit for being appointed to work in the process covered in Appendix 'A', such person shall have a right of appeal to the ~~Certifying Surgeon~~ **Medical Officer**, whose opinion shall be final in this regard.
- (4) The worker suspended from the process owing to the circumstances covered in sub-para (2) shall be employed again in the same process only after obtaining the Fitness Certificate from the ~~Certifying Surgeon~~ **Medical Officer** and after making entries to that effect in the health register.

PART VII

Additional Welfare Amenities

1. Washing facilities.-

- (1) There shall be provided and maintained in every factory for the use of all the workers taps for washing, at the rate of one every 15 persons including liquid soap in a container with tilting arrangements and nail brushes or other suitable means for effective cleaning. Such facilities shall be conveniently accessible and shall be kept in a clean and hygienic condition.
- (2) If washing facilities as required above are provided for women, such facilities shall be separate for them and adequate privacy at all times shall be ensured in such facilities.

2. Mess room facilities.-

- (1) The occupier of all the factories carrying out processes covered in Appendix 'A' and employing 50 workers or more, shall provide for all the workers working in a shift mess room facilities which are well ventilated and provided with tables and sitting facilities along with the provision of cold and hygienic **drinking water facilities**.
- (2) Such facilities shall include suitable arrangements for cleaning and washing and shall be maintained in a clean and hygienic condition.

3. Cloakroom facilities.-

- (1) The occupier of every factory carrying out any process covered in Appendix 'A' shall provide for all the workers employed in the process cloak room facilities with lockers. Each worker shall be provided with two lockers, one for work clothing and another separately for personal clothing and the lockers should be such as to enable the keeping of the clothing in a hanging position.
- (2) The cloak room facilities provided in pursuance of sub-para (1) shall be located as far as possible near to the facilities provided for washing in pursuance of para 1(1). If it is

not possible to locate the washing facilities the cloakroom facilities shall have adequate and suitable arrangements for cleaning & washing.

4. Special bathing facilities.-

- (1) The occupier of any factory carrying out the process covered under Appendix 'B' shall provide special bathing facilities for all the workers employed and such facilities shall be provided at the rate of 1 for 25 workers and part thereof, and shall be maintained in a clean and hygienic condition.
- (2) The occupier shall insist all the workers employed in the processes covered in Appendix 'B' to take bath after the completion of the day's or shift work using the bathing facilities so provided and shall also effectively prevent such of those workers taking bath in any place other than the bathing facilities.
- (3) Notwithstanding anything contained in sub-para (1) above, the Chief Inspector-cum-Facilitator may require in writing the occupier of any factory carrying out any other process for which his opinion bathing facilities are essential from the health point of view, to provide special bathing facilities.

PART VIII

1. Duties of workers.-

- (1) Every worker employed in the processes covered in Appendix 'A' and Appendix 'B' shall not make safety device or appliance or any guarding or fencing arrangement, inoperative or defective and shall report the defective condition of the aforesaid arrangements as soon as he is aware of any such defect.
- (2) Before commencing any work, all workers employed in processes covered in Appendix 'A' shall check their workplace as well as the machinery, equipment or appliance used in the processes and report any mal-function or defect immediately to the supervisor or any responsible person of the management.
- (3) All workers shall co-operate in all respects with the management while carrying out any work or any emergency duty assigned to them in pursuance of this schedule and shall always use all the personal protective equipment issued to them in a careful manner.
- (4) All workers employed in the processes covered in Appendix 'A' or Appendix 'B' shall not smoke in the process area or storage area. If special facilities are provided by the management only such facilities should be used.
- (5) All workers employed in the processes covered in Appendix 'A' shall not remain in unauthorised place or carry out unauthorised work or improvise any arrangement or adopt short cut method or misuse any of the facilities provided in pursuance of the Schedule, in such a manner as to cause risk to themselves as well as or to others employed.
- (6) The workers shall not refuse undergoing medical examination as required under these rules.

PART IX

Restrictions on the employment of ~~young persons under 18 years of age~~ adolescents and women

- (1) The Chief Inspector-cum-Facilitator of Factories may by an order in writing, restrict or prohibit the employment of women and ~~young persons~~ adolescents under the age of 18, in any of the processes covered in Appendix 'A' of this schedule on considerations of health and safety of women and ~~young persons~~ adolescents.
- (2) Such persons who are restricted or prohibited from working in the process due to the order issued in pursuance of sub-para (1) above shall be provided with alternate work which is not detrimental to their health or safety.

PART X

Exemptions

~~1. Power of exemption. The State Government or subject to the control of the State Government the Chief Inspector-cum-Facilitator may exempt from the compliance with any of the requirements of this Schedule partly or fully, any factory carrying out processes covered in Appendix 'A', if it is clearly and satisfactorily established by the occupier that the compliance with any of the requirement is not necessary to ensure the safety and health of persons employed suitable and effective alternate arrangements are available to any of the requirements covered in this schedule.~~

Appendix 'A'

Any works or that part of works in which -

- (a) the manufacture, manipulation or recovery of any of the following is carried on :-
 - (i) sodium, potassium, iron, aluminium, cobalt, nickel, copper, arsenic, antimony, chromium, zinc, selenium, magnesium, cadmium, mercury, beryllium and their organic and inorganic salts, alloys, oxides and hydroxides;
 - (ii) ammonia, ammonium hydroxide and salts of ammonium;
 - (iii) the organic or inorganic compounds of sulphurous, sulphuric, nitric, nitrous, hydrochloric, hydrofluoric, hydriodic, hydro sulphuric, hydrobromic, boric;
 - (iv) cyanogen compounds, cyanide compounds, cyanate compounds;
 - (v) phosphorous and its compounds other than organo phosphorus insecticides.
 - (vi) chlorine
- (b) hydrogen sulphide is evolved by the decomposition of metallic sulphides, or hydrogen sulphide is used in the production of such sulphides;

- (c) bleaching powder is manufactured or chlorine gas is produced in chlor-alkali plants;
- (d) (i) gas tar or coal tar or bitumen or shale oil asphalt or any residue of such tar is distilled or is used in any process of chemicals manufacture;
(ii) tar based synthetic colouring matters or their intermediates are produced;
- (e) nitric acid is used in the manufacture of nitro compounds;
- (f) explosives are produced with the use of nitro compounds;
- (g) aliphatic or aromatic compounds or their metallic and non-metallic derivatives or substituted derivatives, such as chloroform, ethylene glycol, formaldehyde, benzyle chloride, phenol, methyl ethyl keytone peroxide, cobalt carbonyl, tungsten carbide etc. are manufactured or recovered.

Appendix 'B'

Concerning Special Bathing Accommodation in pursuance of Para 4 of Part IV

1. Nitro or amido processes
2. All chrome processes
3. Processes of distilling gas or coal tar or processes of chemical manufacture in which tar is used
4. Processes involving manufacture, manipulation, handling or recovery of cyanogen compound, cyanide compound, cyanate compounds
5. Processes involving manufacture of bleaching powder or production of chlorine gas in chlor-alkali plants
6. Manufacture, manipulation or recovery of nickel and its compounds
7. All processes involving the manufacture, manipulation or recovery of aliphatic or aromatic compounds or their derivatives or substituted derivatives.

Appendix 'C'

Ambulance should have the following equipment :

General

- An wheeled stretcher with folding and adjusting devices; Head of the stretcher must be capable of being tilted upward;
- Fixed suction unit with equipment;
- Fixed oxygen supply with equipment;
- Pillow with case;
- Sheets;
- Blankets;
- Towels;
- Emesis bag;
- Bed pan;
- Urinal;
- Glass

Safety equipment :-

- Flares with life of 30 minutes
- Flood lights;
- Flash lights;
- Fire extinguisher dry powder type;
- Insulated gauntlets.

Emergency care equipment :-

Resuscitation :-

- Portable suction unit;
- Portable oxygen unit;
- Bag-valve-mask, hand operated artificial ventilation unit;
- Airways;
- Mouth gags;
- Tracheostomy adapters;
- Short spine board;
- I.V. Fluids with administration unit;
- B.P. manometer;
- Cugg;
- Stethoscope

Immobilisation

- Long & short padded boards;
- Wire ladder splints;
- Triangular bandage;
- Long & short spine boards.

Dressings :-

- Gauze pads - 4" x 4" ;
- Universal dressing 10" x 36" ;
- Roll of aluminium foils;
- Soft roller bandages 6" x 5 yards;
- Adhesive tape in 3" roll;
- Safety pins;
- Bandage sheets;
- Burn sheet.

Poisoning :-

- Syrup of Ipecac; } } Pre packeted in doses
- Activated charcoal; }
- Snake bite kit;
- Drinking water.

Emergency Medicines

- As per requirement (under the advice of Medical Officer only)