

M507 – Health effects of hazardous substances – Revision questions

Section 8 – Overview of health effects

1. Give examples of asphyxiants.
(Pages 90 to 92)
 - Simple asphyxiants – nitrogen, methane, helium, argon
 - Chemical asphyxiants – carbon dioxide, carbon monoxide, hydrogen cyanide, hydrogen sulphide
2. Give examples of respiratory tract irritants.
(Pages 93 and 94)
 - Upper respiratory tract irritants – ammonia, chlorine, hydrogen chloride
 - Lower respiratory tract irritants – oxides of nitrogen, phosgene
3. What are the main routes of entry for organic solvents?
(Page 97)
 - Inhalation – rapidly absorbed through lungs – enters blood stream causing systemic effects
 - Skin absorption – can cause local effects as well as systemic effects
4. Give examples of situations where exposure to solvents may occur.
(Pages 98 and 99)
 - Build-up of high vapour concentrations in pits, sumps, tanks, confined spaces etc
 - Closed plant – maintenance work, fugitive emissions, spillages, sampling
 - Transfer of solvents – transfer between vessels, tanks, drums etc – particularly where high vapour concentrations of vapours are displaced from the vessel being filled
 - Evaporation of solvent vapour during normal processes e.g. painting, printing, surface coating
 - Maintenance and cleaning operations
5. What are the general health effects of exposure to organic solvents
(Page 100)
 - Acute – Narcotic effects – headaches, drowsiness, dizziness, unconsciousness
 - Chronic effects – Dermatitis, liver and kidney damage, brain and nervous system effects
6. What are the specific health effects associated with exposure to benzene, glycol ethers, vinyl chloride monomer and n-hexane?

(Pages 101 and 104)

- Benzene – affects bone marrow – carcinogen, leukaemia, anaemia
- Glycol ethers – possible reproductive effects
- Vinyl chloride monomer – Raynaud's phenomenon, liver cancer (angiosarcoma)
- N-hexane – Nerve damage, peripheral neuropathy

7. Give examples of industries where styrene is used

(Pages 102 and 103)

- Glass reinforced plastics industry – boat building, container manufacturing etc
- Rubber industry – production of styrene-butadiene rubber

8. What are the health effects of isocyanates? Give examples of uses of isocyanates

(Pages 103 and 104)

- Irritating to skin, eyes, mucous membranes
- Respiratory sensitiser
- 2 part polyurethane paints
- Production of rigid and flexible foams
- Binder in foundry moulds and wood particle boards

9. What are the major health effects of the following metals – cadmium, hexavalent chromium, lead and zinc?

(Pages 105 to 113)

- Cadmium – acute – cadmium oxide fume can cause pulmonary irritation and oedema, chronic – emphysema of the lungs, kidney damage, cancer
- Hexavalent chromium – acute – irritation and ulceration of skin and mucous membranes, chronic lung cancer, dermatitis and sensitisation
- Lead – anaemia, fatigue, possible brain damage – particular problem for unborn children via mother's placenta
- Zinc – metal fume fever (flu-like symptoms)

10. What are the health effects of exposure to crystalline silica (quartz)? Give examples of industries / processes where crystalline silica is a potential problem.

(Pages 113 to 115)

- Silicosis – a chronic pneumoconiosis after many years exposure
- Increased risk of lung cancer
- Very high exposure may cause acute or accelerated pneumoconiosis
- Mining / quarrying
- Foundries – use of sand moulds
- Pottery and ceramics
- Refractory materials / furnace linings installation and removal

11. What are the particular issues with regard to assessing potential health effects from exposure to nanoparticles?

(Pages 116 and 117)

- Small size of particles mean that the lung macrophages may not detect them
- They can also penetrate cell membranes and deposit or be transported around the body
- Lack of toxicological data (particularly chronic effects) for many new materials
- Uncertainty on best method to assess health risk – surface area or weight concentration

12. What are the health effects of exposure to diesel engine exhaust?

(Page 118)

- Acute – irritation of nose, eyes and respiratory tract, headache, fatigue
- Chronic – bronchitis, may exacerbate asthma symptoms, probable carcinogen

13. Give examples of natural substances that may cause an allergic reaction from proteins within the substance.

(Pages 118 to 121)

- Latex – gloves, rubber manufacturing
- Enzymes – food processing, detergents
- Flour, grain dust, egg protein – food industry

14. What are the three main health effects from exposure to asbestos fibres? What factors increase the risks of developing the diseases?

(Pages 122 to 125)

- Asbestosis – fibrotic pneumoconiosis from high exposure levels over many years.
- Lung cancer – no safe exposure level, particularly associated with exposure to blue and brown asbestos, risk greatly increased with smoking (synergistic)
- Mesothelioma – cancer of lung lining (pleura) – no safe exposure level, particularly associated with exposure to blue and brown asbestos

Asbestos is only a problem where fibres become airborne and can be inhaled. Main risk now is inadvertent disturbance of asbestos in-situ.