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# BOOK 1 – S. S. 1

## CHAPTER 1[Chemical Industry]

### OBJ

- Chemicals that are produced in small quantities and with very high degree of purity are** A. bulk chemicals. B. fine chemicals. C. heavy chemicals. D. light chemicals. [2008/48][2016/6]
- Which of the following raw materials is used in the plastic industry?** A. Calcium. B. Ethene. C. Hydrogen. D. Methane. [2009/41][2013/46][2018/1]
- Which of the following substances is a heavy chemical?** A. Ammonia. B. Barium hydroxide. C. Hydrochloric acid. D. Tetraoxosulphate (VI) acid. [2015/44]
- Which of the following substances cannot be classified as a heavy chemical?** A.  $\text{AgNO}_3$ . B.  $\text{CaO}$ . C.  $\text{CaOCl}_2$ . D.  $\text{H}_2\text{SO}_4$ . [2010/49]
- The production of biogas from the fermentation of waste materials is an example of** A. combustion. B. incineration. C. refining. D. recycling. [2014/46]
- Which of the following statements about fine chemical is correct?** A. is injurious to health. B. has low degree of purity. C. is produced in relatively small amount. D. can be stored for a long [2013/49]
- Which of the following raw materials is used in the plastic industry** A. Ethene. B. Methane. C. Sulphur. D. Hydrogen. [2018/1]
- Fats and oils can be obtained from any of the following sources except** A. paraffin oil. B. animals. C. groundnuts. D. palm kernel. [2017/45]
- Which of the following materials is classified as a non-biodegradable pollutant?** A. Animal hide. B. Paper. C. Plastic. D. Wood. [2013/50]
- Which of the following statements about thermoplastic material is correct?** A. do not melt on heating. B. harden on heating. C. decompose on heating. D. soften and melt on heating. [2013/47]
- The following are heavy chemicals except** A. tetraoxosulphate (VI) acid. B. caustic soda. C. sodium trioxocarbonate (IV). D. dyes. [1988/30]
- The major raw material in a plastic industry is** A. ethanol. B. sulphur. C. methylethanoate. D. ethene. [1989/11]
- Which of the following compounds is not a raw material for the manufacture of plastics?** A. Ethyne. B. Ethane. C. Monochloroethene. D. Propene [1992/38]
- Vulcanization of rubber** A. stops the growth of fungus on the rubber. B. increases the solubility of the rubber. C. decreases the elasticity of the rubber. D. hardens the rubber through cross-linkage. [1992/40]
- The factors which should be taken into consideration when establishing a paint industry include:** I. energy requirements II. disposal system for effluents. III. adequacy of water supply IV. availability of pigments A. IV only. B. I & III. C. III & IV. D. I, II, III, IV. [1993/5]
- The key factor to be considered in siting a chemical industry is** A. favourable climatic conditions. B. the availability of space to store raw materials. C. its nearness to other industrial establishments. D. its nearness to the source of raw materials. [2004/40]
- In which of the following processes is biotechnology not applied** A. Manufacture of drugs. B. Treatment of domestic sewage. C. Production of alcoholic beverages. D. Electroplating of metals. [2005/50]
- Which of the following establishments uses the process of fermentation in its operation?** A. Fertilizer plant. B. Textile industry. C. Brewery. D. Soap manufacturing industry. [2001/41]
- Biotechnology is applied in the following except** A. baking industry. B. wine production. C. production of antibiotics. D. manufacture of soap. [2000/49]
- A plastic which cannot be softened by heat is described as** A. thermosetting. B. non-biodegradable. C. thermoplastic. D. malleable. [2000/50]
- Biotechnology is applied in the** A. treatment of sewage. B. treatment of water. C. purification of chemicals. D. purification of metals. [2019/38]
- Which of the following substances can be classified as heavy chemical?** A.  $\text{CaOCl}_2$  B.  $\text{H}_2\text{SO}_4$  C.  $\text{AgNO}_3$  D.  $\text{CaO}$ . [2019/41]
- Which of the following substances is an example of a fine chemical?** A. Sodium hydroxide B. Hydrochloric acid C. Ethylene D. Ammonia. [2020/1]
- A factor that is considered most important when siting a chemical industry is** A. nearness to other industrial establishment. B. nearness to raw materials. C. favourable climate conditions. D. availability of storage facilities. [2020/17]

### THEORY

- (a) Name one fine chemical used in textile industries. (b) List two effects of global warming. [2018/1]
- (a) Explain briefly the term chemical industry. (b) State three factors that should be considered in siting a chemical industry. (c) Name the constituents of cement. (d) How does mortar set? [2013/7]
- Consider the following compounds:  $\text{CaO}$ ,  $\text{CaCO}_3$ ,  $\text{Ca(OH)}_2$ ,  $\text{NaOH}$ ; Which of them is used in the manufacture of cement. [2007/6]
- List the raw materials needed for the manufacture of soap. [2018/5]
- (a)(i) Define each of the following terms: I. biotechnology; II. biogas. (ii) State two applications of biotechnology. (b) (i) Describe briefly the production of ethanol from sugarcane juice, (ii) State the by-product of the process in

- 5(b)(i). (iii) Mention two uses of the by-product, (iv) Ethanol can be produced from both cane sugar and petroleum. Explain briefly why the ethanol from cane sugar is renewable but that from petroleum is non-renewable. (c) Distinguish between heavy chemicals and fine chemicals. Give one example of each chemical. (d) Arrange the following gases in increasing order of deviation from ideal gas behaviour: HCl; O<sub>2</sub>; Cl<sub>2</sub>. Give reason(s) for your answer. [2012/8]
6. (i) Describe briefly the production of biogas using a biogas generator (ii) State two uses of biogas. [2014/5]
7. What is meant by each of the following terms? (i) Raw material (ii) Primary product. [2015/1]
8. (a) Define polymerization. (b) Mention two types of polymerization. [2009/3]
9. Give one example of (I). naturally occurring polymer (II). synthetic polymer. [2009/3]
10. (a) State two properties of plastic. (b) Name the components of duralumin. [2015/1]
11. Give one example of: (a) heavy chemical (b) fine chemical. [1988/2]
12. Name the major raw materials used in the manufacture of the following (i) polythene (ii) margarine (iii) cement [1988/8]
13. Mention one major chemical industry in each case which requires the following as raw materials: (a) petrochemicals (b) cellulose [1993/3]
14. Mention one type of chemical industry that utilizes ethene as raw material [1995/12]
15. (a) Differentiate between a fine chemical and a heavy chemical (b) Give one example of each in (a) above [2004/4]
16. State one effect of global warming. [2020/1]
17. Why is H<sub>2</sub>SO<sub>4</sub> regarded as a heavy chemical? [2020/4]
18. (i) Name two chemical industries. (ii) State three effects of a chemical industry on the community in which it is sited. [2020/5]

## CHAPTER 2 [Particulate Nature of Matter]

### Chemical & Physical Changes

#### OBJ

- The energy evolved when magnesium burns in air is in the form of A. heat. B. heat and sound. C. light and heat. D. sound. [2012/28]
- The following are miscible with water except A. ethylethanoate. B. methanol. C. ethanoic acid. D. methanoic acid. [1989/20]
- Which of the following processes is a physical reaction? A. Electrolysis. B. Hydrolysis. C. Allotropic change. D. Neutralization. [1992/15]
- Which of the following will decrease in mass when heated in air? I. Magnesium ribbon II. Powdered sulphur III. Calcium trioxocarbonate (IV) IV. Magnesium tetraoxosulphate (VI) heptahydrate A. IV Only. B. I and II only. C. III and IV only. D. I, II and III only. [1998/47]
- Allotropes of an element differ in their A. physical properties. B. chemical properties. C. mass numbers. D. electronic configuration. [2001/1]

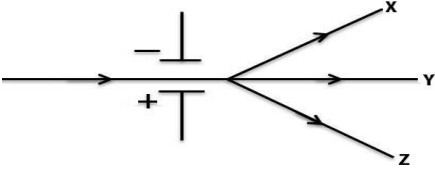
#### THEORY

- Give two differences between a physical change and a chemical change. [2013/4]
- Classify each of the following as physical change or a chemical change: (a) fractional distillation of liquefied air (b) cracking of petroleum fractions; (c) Conversion of rhombic sulphur to monoclinic sulphur; (d) Chromatographic separation of chlorophyll [1993/1]

### Atomic Theory & Constituents of the Atom

#### OBJ

- Which of the following species determines the chemical properties of an atom? A. Electron. B. Neutron. C. Nucleus. D. Proton. [2017/1]
- Pauli exclusion principle is related to A. quantity of electrons in the valence shell. B. filling the orbitals with lower energy first. C. the filling of degenerated orbitals. D. quantum numbers of electrons. [2017/3]
- Atomic orbital is A. the circular path through which electrons revolve round the nucleus. B. a region around the nucleus where electrons are most likely to be found. C. the path around the nucleus through which electrons move. D. the path around the nucleus through which protons move. [2017/8]
- The negatively charged particle in an atom is the. A. electron. B. neutron. C. position. D. proton. [2015/1]
- How many orbitals are contained in an atom with atomic number 13? A. 7. B. 6. C. 5. D. 3. [2015/2]
- An atom X consists of 6 protons, 6 electrons and 7 neutrons. Which of the following representations of the atom is correct? A.  ${}^{13}_6\text{X}$  B.  ${}^{13}_7\text{X}$  C.  ${}^{19}_6\text{X}$  D.  ${}^{19}_7\text{X}$ . [2016/2]
- How many electrons are present in  ${}^9_4\text{Be}^{2+}$  A. 2. B. 4. C. 5. D. 6. [2016/3]
- The number of unpaired electrons in an atom of an element  ${}_8\text{Q}$  is A. 2. B. 4. C. 6. D. 8. [2015/13]
- An atom of an element X gains two electrons. The symbol of the ion formed is A. X<sup>+</sup>. B. X<sup>2+</sup>. C. X<sup>2-</sup>. D. X<sup>-</sup>. [2013/4]
- Which of the following scientists discovered the neutron? A. Ernest Rutherford. B. J. J. Thompson. C. James Chadwick. D. R. A. Millikan. [2009/1]

11. How many protons does  $^{40}_{20}\text{Ca}$  contain? A. 20. B. 30. C. 40. D. 60. [2009/2]
12. Atoms are electrically neutral because they A. do not conduct electricity. B. contain equal number of protons and electrons. C. are composed of neutrons and electrons. D. cannot be attracted by electromagnetic field. [2018/42]
13. The atomic number of an isotope of hydrogen is equal to its mass number because it A. has a totally filled valence shell. B. has a high charge to mass ratio. C. does not contain neutrons. D. exhibits isotopy. [2018/45]
14. The mass spectrometer can be used to measure mass of A. an atom. B. an electron. C. a proton. D. a neutron. [2008/1]
15. Find the number of neutrons in an atom represented by  $^{45}_{21}\text{X}$  A. 21. B. 24. C. 45. D. 66. [2008/2]
16. Which of the following species correctly represents an ion of M with 13 protons and 10 electrons? A.  $_{10}\text{M}^{3+}$ . B.  $_{10}\text{M}^{3-}$ . C.  $_{13}\text{M}^{3+}$ . D.  $_{13}\text{M}^{3-}$  [2010/12]
17. Which of the following gases contains the highest number of atoms at s.t.p.? A. 6 moles of neon. B. 3 moles of oxygen. C. 2 moles of chlorine. D. 1 mole of ethane. [2010/24]
18. A beam of particles was passed between charged plates as illustrated in the diagram below. X, Y and Z are respectively?
- 
- A. electron, neutron and proton. B. electron, proton and neutron. C. proton, neutron and electron. D. proton, electron and neutron. [2012/3]
19. An atom W has 17 electrons and 18 neutrons. Which of the following representations of the atom is correct? A.  $^{17}_{18}\text{W}$  B.  $^{18}_{17}\text{W}$  C.  $^{35}_{17}\text{W}$  D.  $^{35}_{18}\text{W}$ . [2014/9]
20. Which of the following species is/are positively charged? I.  $\alpha$  particles II. Oxonium ions III. Ammonium ions IV. Protons A. IV only. B. I & III. C. III & IV. D. I, II, III, & IV. [1992/9]
21. The mass of an element is 27 and its atomic number is 13. What is the composition of the nucleus of its atom? A. 13 electrons and 14 protons. B. 13 neutrons and 14 protons. C. 13 protons and 14 neutrons. D. 13 electrons and 14 neutrons. [2004/1]
22. Given the symbol  $^{40}_{20}\text{Y}$ , it can be deduced that Y has A. 60 neutrons. B. an atomic number of 20. C. a mass number of 60. D. 40 electrons. [1995/1]
23. An element with mass number 133 and atomic number 55 has A. 55 electrons and 55 neutrons. B. 55 electrons and 78 neutrons. C. 78 electrons and 78 neutrons. D. 78 electrons and 55 neutrons. [2006/4]
24. The existence of two or more forms of the same element in the same physical state is known as A. allotropy. B. resonance. C. hybridization. D. isotopy [1996/1]
25. Which of the following is not true of, the elements represented by the symbols  $^a_b\text{X}$  and  $^c_b\text{Y}$  A. X and Y have the same number of electrons. B. X and Y have the same number of protons. C. X and Y are isotopes. D. X and Y represent atoms of different elements. [1988/27]
26. Isotopes of a given element have the same I. atomic number II. electronic configuration III. chemical properties IV. mass number. A. IV only. B. I and II. C. III and IV. D. I, II and III. [1995/44]
27. Polyatomicity is illustrated by molecules of A. sulphur. B. carbon (IV) oxide. C. noble gases. D. liquefied oxygen. [1994/23]
28. The atom of an element X is represented as  $^Y_Z\text{X}$  The basic chemical properties of X depend on the value of A. Y. B. Z. C. Y - Z. D. Z - Y. [2002/2]
29. The atomic number of chlorine is 17. What is the number of electrons in a chloride ion? A. 16. B. 17. C. 18. D. 19. [2002/3]
30. A hydrogen atom which has lost an electron contains A. one proton only. B. one neutron only. C. one proton and one neutron. D. one proton, one electron and one neutron. [2002/4]
31. The conclusion from Rutherford's alpha-scattering experiment is that A. atoms are mostly empty space with a small nucleus. B. emissions from radioactive substances consist of three main components. C. there is nuclear pull on orbital electrons. D. electrons are deflected by both magnetic and electric fields. [2002/6]
32. Compounds that have the same molecular formula but different structures are said to be A. allotropic. B. polymorphic. C. polymeric. D. isomeric. [1991/40]
33. Which of the following is suitable for determining different isotopes present in an element which exhibit isotopy? A. Sensitive weighing balance. B. Cathode ray tube. C. Mass spectrometer. D. Geiger Muller counter. [1991/50]
34. When an element can exist in two or more forms in the same physical state, the element is said to exhibit A. isotopy. B. isomerism. C. allotropy. D. hygroscopy. [1989/26]
35. The mass number of an atom of an element is the sum of its A. electrons, neutrons and protons. B. electrons and protons. C. protons and neutrons. D. orbital electrons. [1997/2]
36. If 11 g of a gas occupies  $5.6 \text{ dm}^3$  at s.t.p, calculate its vapour density. (1.0 mole of a gas occupies  $22.4 \text{ dm}^3$  at s.t.p.) A. 22. B. 44. C. 66. D. 88. [2003/10]
37. A sodium atom and a sodium ion have the same A. number of neutrons. B. number of electrons. C. electric charge. D. electronic structure. [1997/7]
38. Which of the following pairs illustrates isotopy? A. But-1-ene and but-2-ene. B. Ortho-hydrogen and parahydrogen. C. Oxygen and ozone. D. Hydrogen and deuterium. [1993/19]
39. The following gases are diatomic except A. nitrogen. B. helium. C. hydrogen. D. fluorine. [1993/44]

40. Scientists whose experiments gave evidence about the nature and structure of the atom include  
I. J.J. Thompson II. Lord Rutherford  
III. Le Chatelier IV. Robert Boyle A. IV only. B. I and II only. C. III and IV only. D. I, II and III only. [1997/46]
41. An atom with 17 protons, 17 electrons and 18 neutrons has a mass number of A. 17. B. 18. C. 34. D. 35. [1998/1]
42. Given only the atomic number of an element, it is possible to determine the number of I. protons in its nucleus II. unpaired electrons present III. electrons in its outermost shell IV. neutrons in its nucleus A. IV only. B. I and II only. C. III and IV only. D. I, II and III only. [1998/43]
43. What is the mass number of an element having 20 neutrons, 15 protons and 15 electrons? A. 15. B. 30. C. 35. D. 50. [2005/2]
44. An element which can exist in two or more forms in the same physical state, exhibits A. isotopy. B. structural isomerism. C. allotropy. D. variable valency. [2005/9]
45. Calcium atom ionizes by A. gaining two electrons. B. losing two electrons. C. sharing two electrons. D. gaining two protons. [1999/7]
46. Chlorine atom forms  $\text{Cl}^-$  by A. losing one electron. B. sharing one electron. C. donating, lone pair of electrons. D. gaining one electron. [2000/3]
47. Which of the following pairs of species contains the same number of electrons?  
[ ${}_6\text{C}$ ,  ${}_8\text{O}$ ,  ${}_{10}\text{Ne}$ ,  ${}_{11}\text{Na}$ ,  ${}_{12}\text{Mg}$ ,  ${}_{13}\text{Al}$ ,  ${}_{17}\text{Cl}$ ] A.  $\text{Mg}^{2+}$  and  $\text{Al}^{3+}$ . B.  $\text{Cl}^-$  and  $\text{Ne}$ . C.  $\text{Na}^+$  and  $\text{Mg}$ . D.  $\text{C}$  and  $\text{O}^{2-}$ . [2006/5]
48. If an atom is represented by  ${}_{19}^{39}\text{X}$ , which of the following deductions is correct? A. It contains 20 protons. B. It forms a covalent chloride. C. Its atomic number is 39. D. It is an alkali metal. [2004/2]
49. The atoms  ${}_{29}^{64}\text{Cu}$  and  ${}_{30}^{65}\text{Zn}$  have the same number of A. nucleons. B. electrons. C. neutrons. D. protons. [2019/45]
50. How many electrons does  ${}_{15}^{31}\text{P}^{3-}$  contain? A. 12 B. 15 C. 16 D. 18. [2020/44]
51. The atomic number of an atom would be equal to its mass number if it A. has a totally filled valence shell. B. has a high charge to mass ratio. C. does not contain neutrons. D. exhibits isotopy. [2020/45]

### THEORY

- Write three subatomic particles with their corresponding relative masses. [2008/4]
- (a) What phenomenon is exhibited by an element Z which exist as  ${}_{17}^{35}\text{Z}$  and  ${}_{17}^{37}\text{Z}$ ? (b) What accounts for the difference in the mass numbers of the element Z? [2017/2]
- (a) What is the structure of the atom as proposed by Rutherford? (b) Distinguish between the atomic number and the mass number of an element. [2012/1]
- Copy and complete the following table:

Particles	Number of neutrons	Number of electrons	Number of protons	Mass number
$\text{W}^{2+}$	12			24
$\text{X}^{2-}$			8	16
Y		13		27
Z	12	11		

[2013/1]

- Define each of the following terms: (i) ion. (ii) Isotopes. [2014/2]
- (a) Explain briefly the term atomic orbital. (b) State three postulates of Dalton's atomic theory. (c) List two limitations of this theory in the study of the atom [2015/2]
- (a) What are nucleons? (b) Consider the following atoms:-  ${}^{\text{R}}_{\text{T}}\text{X}$ ;  ${}^{\text{S}}_{\text{T}}\text{X}$ . State the phenomenon exhibited by two atoms. (c) What is the difference between the atoms? (d) Give two examples of elements that exhibit the phenomenon stated in (c) [2016/2]
- What are isotopes?
- An element X is represented as  ${}_{20}^{40}\text{X}$ , how many electrons and how many neutrons are present in the atom of X? [1988/14]
- Consider the atoms represented as shown below.  ${}^{\text{q}}_{\text{p}}\text{X}$   ${}^{\text{r}}_{\text{p}}\text{X}$ . (a) State the relationship between the two atoms (b) What is the differences between them? (c) Give two examples of elements which exhibit the phenomenon illustrated above. [1991/1]
- State the phenomenon exhibited by existence of atoms of the same element having different mass numbers [1993/5]
- What name is given existence of an element in various forms in the same physical state [1995/2]
- (a) List the three types of particles present in atoms, (b) Name the element which does not contain all the three particles in its atom. Mention the particle that is not present, [1995/11]
- X is an element which exists as an isotopic mixture containing 90% of  ${}_{19}^{39}\text{X}$  and 10% of  ${}_{19}^{41}\text{X}$ ? How many neutrons are present in the isotope  ${}_{19}^{41}\text{X}$  [1997/1]
- Define allotropy [1999/5]
- (a) What is isotopy? (b) Illustrate with suitable example [2005/1]