

ENGINEERING CHEMISTRY



1ST AND 2ND SEMESTER

BASIC SCIENCE

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CHAPTER-1

02 MARK QUESTION

1. What are fundamental sub-atomic particles?
2. Write any two drawbacks of Rutherford's atomic model.
3. What are the results of Rutherford's gold foil experiment?
4. What do you mean by quantization of energy?
5. What do you mean by the stationary states of atoms?
6. How does electronic transition occur according to Bohr's atomic model?
7. What is the origin of spectral lines according to Bohr's atomic model?
8. Which circular orbits are allowed for the electrons to revolve?
9. Arrange the following in the increasing order of their energy content: 4f, 5p, 6s, 4p, 3d.
10. Write down the electronic configurations of Cr and Cu.
11. Write down the electronic configurations of Ca^{2+} and O^{2-} .
12. Write down the electronic configurations of Mg^{2+} and N^{3-} .
13. Write down the electronic configurations of Mn^{2+} and Cu.
14. Write down the electronic configurations of Cr^{3+} and Fe^{2+} ions.
15. Define mass number. How many protons, electrons and neutrons are present in an ion of N^{3-} ?
16. Define isotope with a suitable example.
17. Define isotope. What are the isotopes of chlorine?
18. Define isobar with a suitable example.
19. Define isotone with a suitable example.

05 MARK QUESTION

1. Explain the discovery of atomic nuclei.
2. Explain Rutherford's atomic model.
3. Explain the failures of Rutherford's atomic model.
4. Write down the postulates of Bohr-Bury Scheme.
5. Define and explain the Aufbau principle. Write down the electronic configuration of manganese.
6. How did Bohr overcome Rutherford's atomic model?
7. Define and explain Hund's rule of maximum multiplicity.
8. Explain electronic transition according to Bohr's atomic theory.
9. Explain the origin of atomic spectral lines.

CHAPTER-2

02 MARK QUESTION.

1. Define chemical bonding.
2. Define electrovalent bonding.
3. Define covalent bonding.
4. Define co-ordinate bonding.
5. What is Lattice energy? How is it related with the strength of an ionic bond?
6. Mention the conditions for formation of electrovalent bonding.
7. Mention the conditions for formation of co-ordinate bonding.
8. Define ionization potential. What should be the value of it for the metals to form ionic bond?
9. Define electron affinity. What should be the value of it for the metals to form ionic bond?
10. Which types of chemical bonding exist in $MgCl_2$ and NH_3 ?
11. Which types of chemical bonding exist in $MgCl_2$ and H_2O ?

05 MARK QUESTION.

1. Define and explain electrovalent bonding with a suitable example.
2. Define and explain covalent bonding with a suitable example.
3. Define and explain co-ordinate bonding with a suitable example.
4. Explain the formation of NH_3 and NH_4^+ .
5. Explain the conditions of formation of electrovalent bond.
6. Explain the conditions of formation of co-ordinate bond.
7. Define covalent bond. Explain the formation of CH_4 molecule.
8. Define covalent bond. Explain the formation of H_2O molecule.
9. Define covalent bond. Explain the formation of O_2 molecule.
10. Define covalent bond. Explain the formation of N_2 molecule.
11. Define covalent bond. Explain the formation of NH_3 molecule.
12. Define electrovalent bonding. Explain the formation of $MgCl_2$ molecule.
13. Define and explain co-ordinate bonding and explain the formation of NH_4^+ ion.
14. Define and explain co-ordinate bonding and explain the formation of SO_2 molecule.
15. Write down at least ten properties of ionic compounds.
16. Write down at least ten properties of covalent compounds.

CHAPTER-3

02 MARK QUESTION.

1. Define Arrhenius theory of acids and bases.
2. Define Bronsted - Lowery theory of acids and bases.
3. Define Lewis theory of acids and bases.
4. Justify that all Arrhenius acids are Bronsted-Lowery acids.
5. Explain how BF_3 is a Lewis acid.
6. Explain how SiCl_4 is a Lewis acid.
7. Explain how BF_3 is a Lewis acid
8. Explain how AlCl_3 is a Lewis acid.
9. Explain how SO_2 is a Lewis acid.
10. Explain how NH_3 is both a Bronsted-Lowery base and a Lewis base.
11. Write down the conjugate acids and conjugate bases of H_2O & NH_3 .
12. What do you mean by conjugate acid-base pair? Explain with a suitable example.
13. CH_3COOH is a weak acid while CH_3COO^- is a strong base. Explain.
14. What is neutralization reaction? Give an example of it.
15. Define salt. How does an acidic salt form?
16. Define salt. How does a basic salt form?
17. What is double salt? Give an example.
18. What is co-ordination salt? Give an example.
19. What is mixed salt? Give an example.
20. Explain how bleaching powder is a mixed salt.
21. Explain how potash alum is a double salt.

05 MARK QUESTION.

1. Define and explain Arrhenius theory of acids and bases.
2. Define and explain Bronsted-Lowery theory of acids and bases.
3. Define and explain Lewis theory of acids and bases.
4. Explain the limitations of Arrhenius theory.
5. Explain the limitations of Bronsted-Lowery theory.
6. Explain the limitations of Lewis theory.
7. Justify that all Arrhenius acids are Bronsted-Lowery acids, but all Arrhenius bases are not Bronsted -Lowery bases.
8. Explain how SiCl_4 and BF_3 are acids.
9. Explain why SiCl_4 is an acid but CCl_4 is not.
10. Define and explain conjugate acid-base pair with a suitable example.
11. Justify your answer that H_2O is amphoteric.
12. How many grams of KOH are required to get 2 lit of its solution having $\text{PH}10$?
13. Explain how potash alum is a double salt while, $\text{K}_3[\text{Fe}(\text{CN})_6]$ is a complex salt.
14. 14.7 grams of H_2SO_4 are present in 2 litres of its solution. Find morality and normality of the solution.

15. How many grams of calcium hydroxide are required to prepare 10-2M and 10-2N solutions?
16. How many grams of Deca hydrated sodium carbonate of 80% purity are required to prepare 2.5 lit. of decinormal solution?

CHAPTER-4

02 MARK QUESTION.

1. Define atomic weight.
2. Define molecular weight. What is the molecular weight of sulphuric acid?
3. Define equivalent weight. What is the equivalent weight of H_3PO_4 ?
4. Find the molecular weights of $Al_2(SO_4)_3$ and $CuCO_3$.
5. Find the equivalent weights of H_3PO_4 and H_3PO_3 .
6. Find the equivalent weights of $Ca(HCO_3)_2$ and H_3BO_3 .
7. Find the equivalent weights of acetic acid and calcium hydroxide.
8. Derive a relationship between atomic weight, equivalent weight and valance.
9. Define variable equivalent weights. Give suitable examples.
10. Why do the equivalent weights of FeO and Fe_2O_3 vary?
11. 1 gm of a metal on heating with air produces 1.5 g of its oxide. Calculate the equivalent weight of the metal.
12. An oxide of metal contains 60% oxygen. Find the equivalent weight of the metal.
13. Find the equivalent weights of $Ca(OH)_2$ and CH_3COOH .
14. Define molarity . Mention its unit.
15. How many grams of $NaCl$ are required to prepare 2 litres of its solution having molarity 1M?
16. Define normality.
17. 4 grams of $NaOH$ are present 2 lit of its solution. Find its normality, molality.
18. Define molality.
19. 5.6 gram of KOH are present in 200 grams of water. Find molality of the solution.
20. Find the equivalent weights of calcium chloride and nitric acid.
21. 8 grams of $NaOH$ are present in 108 gram of its solution. Find molality of the solution.
22. Define normality. Mention its unit.
23. What do you mean by decimolar solution?
24. How many gms of Na_2CO_3 are required to prepare one litre of its decimolar solution?
25. Obtain a relationship between molarity and normality.
26. Convert 0.01 M H_2SO_4 in to normality. 27. Convert 10-2N H_2SO_4 in to molarity.
28. Define PH and POH.
29. The PH of a basic solution is 12. What is its hydroxyl ion concentration in moles/lit?
30. Define ionic product of water. What is its value at 250C?
31. What is the importance of PH in sugar industry?
32. Write down the importance of PH in textile industries.

CHAPTER-5

02 MARK QUESTION.

1. Define electrolyte. Give an example of it.
2. Define strong and weak electrolytes with examples.
3. What are non-electrolytes? Give examples.
4. Define electrolysis. Which gas is evolved at the cathode during electrolysis of acidulated water?
5. Define Faraday's 1st law of electrolysis.
6. Define Faraday's 2nd law of electrolysis.
7. Define electrochemical equivalent. Mention its unit.
8. Find the electrochemical equivalent of calcium.
9. Find the electrochemical equivalent of aluminum.
10. How many coulombs of charge are required to get 10 grams of calcium from molten calcium chloride?
11. Define electroplating.
12. What is Galvanisation?
13. What is the relationship between the masses of the substances and their equivalent weights, when the same quantity of electricity is passed through different electrolytes?
14. What is the difference between electrolytes and non-electrolytes?

05 MARK QUESTION.

1. Define electrolyte and electrolysis. What are strong and weak electrolytes? Give examples.
2. Define electrolysis. Explain the process of electrolysis of molten NaCl.
3. Define Faraday's 1st law of electrolysis. How many grams of calcium will be deposited at the cathode by passing 15 ampere of currents through molten CaCl₂ for 30 minutes?
4. Define electrochemical equivalent. Find the ECE of Ca and Al.
5. Define and explain Faraday's 2nd law of electrolysis.
6. Explain the process of applying a coating of zinc over an iron article by the process of electrolysis.
7. Explain the electro refining process of a crude copper bar.
8. Define and explain electrometallurgy.
9. Explain the electrolysis of acidulated water.
10. Define and explain Galvanisation.
11. Define Faraday's 1st law of electrolysis. How many coulombs of charges are required to get 36 grams of magnesium from molten magnesium chloride?

CHAPTER-6

02 MARK QUESTION

1. What do you mean by corrosion?
2. What is atmospheric corrosion?
3. What is water-line corrosion?
4. How is corrosion prevented by the alloy durriron?
5. How the rate of rusting of iron is accelerated in presence of CO₂ in moisture?

05 MARK QUESTION.

1. Define and explain atmospheric corrosion.
2. Define corrosion. Explain waterline corrosion.
3. Explain the alloying process of protection of corrosion.

CHAPTER-7

02 MARK QUESTION.

1. What do you mean by gangue?
2. Mention the basic steps involved in the metallurgical operation.
3. What do you mean by concentration of ore?
4. What happens during oxidation step of metallurgical operation?
5. What happens during reduction step of metallurgical operation?
6. Why only sulphide ores are concentrated by froth floatation method?
7. Which types of ores are concentrated by magnetic separation?
8. Which types of ores are concentrated by gravity separation method?
9. What is leaching?
10. What is the purpose of adding charcoal or coke during smelting?
11. What do you mean by smelting?
12. Define calcinations and roasting.
13. What is slag?
14. What is the principle of distillation method of refining of crude metals?
15. What is electrometallurgy?
16. What is the purpose of addition of flux during smelting?

05 MARK QUESTION.

1. Explain the gravity separation method of concentration of ores.
2. Explain the froth floatation method of concentration of ores.
3. Explain the magnetic separation method of concentration of ores.
4. Explain the gravity leaching process of concentration of ores.
5. Define calcinations. Write down its functions. 6. Define roasting. Write down its function.
7. Define and explain smelting.
8. Explain the electrolytic method of purification of impure copper.

CHAPTER-8

02 MARK QUESTION.

1. What is alloy? Give an example of non-ferrous alloy.
2. What is amalgam? How is it formed?
3. What is the composition and uses of Brass?
4. What is the composition and uses of Bronze?

05 MARK QUESTION

1. Define alloy. Write down the composition and uses of Brass and Bronze.
2. Define alloy. Classify alloys into different types with examples.
3. Define alloy. What do you mean by amalgam? Write the important uses of amalgams.

CHAPTER-9

02 MARK QUESTION.

1. To which class of compound C_4H_{10} belongs and how?
2. To which class of compound C_5H_{10} belongs and how?
3. To which class of compound C_6H_{10} belongs and how?
4. What are saturated hydrocarbons?
5. What are unsaturated hydrocarbons?
6. How C_4H_8 is unsaturated?
7. What are aliphatic hydrocarbons? Give any two examples of it.
8. What is the IUPAC name of isopropyl alcohol?
9. What is the IUPAC name of tertiary butyl alcohol?
10. What is the IUPAC name of isobutyl chloride?
11. Give the structural formula of 4-Chloro-5-methylpent-2-en-2-ol.
12. Define Huckel's rule for aromaticity.
13. How benzene is aromatic?
14. What is tertiary alkyl halide? Give an example of it.
15. What is the general formula of monohydric alcohols? Give a suitable example of it.

05 MARK QUESTION.

1. What are saturated and unsaturated hydrocarbons? Is benzene saturated? Justify your answer.
2. Define and explain Huckel's rule of aromatic with suitable examples.
3. What are aliphatic hydrocarbons? How can you classify them?
4. Define with example: Prefix, word root, primary suffix and secondary suffix.
5. What are the conditions of aromaticity?
6. Mention any two uses of benzene and toluene.
7. Mention any two uses of toluene and phenol.
8. Mention any two uses of toluene naphthalene.
9. Mention any two uses of benzene and Anthracene.
10. Mention any two uses of benzene and BHC.

CHAPTER-10

02 MARK QUESTION.

1. Define soft water and hard water.
2. What is hardness of water?
3. Why hard water does not produce lather with soap solution?
4. What do you mean by temporary and permanent hardness?
5. How temporary hardness can be removed?
6. What is the principle of Lime soda process?
7. What are the advantages of Hot Lime-Soda process?
8. What are the advantages of Ion-exchange process?

05 MARKS QUESTIONS

1. Explain the softening of water by Lime-Soda process.
2. How hard water can be softened by Ion-exchange process?
3. Write the difference between cold lime-soda process and hot lime-soda process.

CHAPTER-11

02 MARK QUESTION.

1. Define lubricant. Give an example of a semi-solid lubricant.
2. Give example of solid lubricants. Write the uses of graphite.
3. What are liquid lubricants?

05 MARK QUESTION.

1. What is a lubricant? Write the major functions of lubricants.
2. Define lubricant. Write the classification of lubricants with examples.

CHAPTER-12

02 MARK QUESTION.

1. Define fuel. Write the characteristics of a good fuel in terms of calorific value and moisture.
2. What is calorific value of fuel? Write its unit.
3. What is CNG?
4. Write the composition of coal gas.
5. Write the composition of producer gas.
6. What are derived fuels? Give two examples.

05 MARK QUESTION.

1. Define fuel .What are the characteristics of a good fuel?
2. Write the composition and uses of water gas and producer gas.
3. Write short notes on LPG and CNG.

CHAPTER-13

02 MARK QUESTION.

1. Define monomer and polymer with example.
2. Define homopolymer and copolymer.
3. What is degree of polymerization?
4. Name the monomer of PVC .Write its two important applications.
5. Name the monomers of Bakelite .Write its two uses.
6. What is natural rubber?
7. Write two advantages of vulcanization.

05 MARK QUESTION.

1. Explain the terms monomer, polymer, homopolymer, co-polymer & degree of polymerization with examples.
2. What is a polymer? Write the composition and uses of Bakelite.
3. Define polymer? Write the composition and uses of PVC.
4. What is vulcanization of rubber? Write the advantages of vulcanization.
5. What are the differences between thermoplastic and thermosetting polymers?

CHAPTER-14

02 MARK QUESTION.

1. What are insecticides? Give two examples.
2. What are fungicides? Write its uses.
3. What are herbicides? Write its uses.

05 MARK QUESTION.

1. Define pesticide. Classify pesticides into different types with examples.
2. Define insecticide, herbicide and fungicide with suitable examples.
3. What are bio-fertilizers? Mention its different types with examples.