

Engineering chemistry Question Bank

Chapter 1

Atomic Structure xxxxxxxxxxxxxxxxxxxx

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Short Type Questions [2 Mark] xxxxxxxxxxxxxxxxxxxx

1. Write the electronic configuration of Cu , N^{3-} , P , Ca^{2+}
2. Find the number of unpaired electrons in an atom of Nickel, Aluminium.
3. Define Hund's Rule.
4. Define Isotopes, Isotones & Isobars with examples of each.
5. Define electronic configuration.
6. Find the number of electrons, protons & neutrons in Al^{3+} , Ca^{2+} , N^{3-} ions.
7. Name the three isotopes of hydrogen.
8. Identify isotopes & isobars in the following.
 ${}^2_1\text{H}$, ${}^{13}_6\text{C}$, ${}^{40}_{20}\text{Ca}$, ${}^1_1\text{H}$, ${}^{40}_{19}\text{K}$, ${}^{14}_6\text{C}$, ${}^3_1\text{H}$, ${}^{40}_{18}\text{Ar}$
9. Define Aufbau's principle. Arrange 3d, 4p, 5s, 4d according to their increasing energy.
10. What are the fundamental particles of an atom?
11. What is the charge & mass of proton, neutron & electron?
12. Which element has no neutron in its nucleus?

Long Type Question [5 Marks]

2/16

1. Explain Bohr-Bury Scheme.
2. What is $(n+l)$ rule? Explain with illustration.
3. Define & explain Hund's Rule. Why is it called maximum multiplicity rule?
4. What are isotopes & isobars? Write their significant features.
5. Write the failure of Rutherford's atomic model.
6. How Bohr rectified the defect of Rutherford's atomic model?
7. What are the postulates of Rutherford Atomic model [5] & Bohr's Atomic Model [5]
8. What are the observations & conclusions drawn from Rutherford Atomic Model?

Chapter - 2

Chemical Bonding

1. What is the type of bonding involved in CaF_2 , H_3O^+ , BaCl_2 , O_2 & SO_2 . [2]
2. What do you mean by ionic compounds? Give an eg. [2]
3. Define a) Covalent Bonding [2]
b) Coordinate or Dative Bonding [2]

4. What is electrovalency? [2] (3/16)
5. How many covalent bonds are present in N_2 , O_2 molecule? [2]
6. What is chemical bond? What are its types? [2]

Long Type Questions [5]

- ① Explain the formation of
- H_3O^+ [5]
 - NH_4^+ [5]
 - H_2O [5]
 - CH_4 [5]
 - CaF_2 [5]
- ② Differentiate ionic compound & covalent compound. [5]
- ③ Define covalent bond. How covalent bond is formed? Explain by giving at least one suitable example. [5]
- ④ Write the characteristics of electrovalent compounds. [5]

Chapter - 3

4/16

Acids, Bases & Salts xxxxxxxxxxxxxxxx

Short Type Questions [2] xxxxxxxxxxxxxxxx

- ① What is an Acid Radical? Give two examples of divalent monatomic acid radical. [2]
- ② Define
a) Complex salt with example
b) Mixed salt with example
c) Acidic salt with example.
- ③ What is neutralisation reaction?
- ④ What do you mean by Conjugate acid-base pair? What is the conjugate acid of CO_3^{2-} , H_2O , NH_3 ?
- ⑤ Define amphoteric substance. Give an example.

Long Type Questions [5] xxxxxxxxxxxxxxxx

- ① ~~What~~ What are the limitations of Arrhenius concept of acid & bases?
- ② Explain Bronsted-Lowry theory of acids & bases with limitations.
- ③ Explain concept of Lewis theory of Acid & Base.
- ④ Compare Arrhenius concept with Lowry concept of Acid & Base.

Short Type Questions [2]

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1. Define normality. Represent its mathematical expression to calculate normality.
2. Define pH of the solution.
3. Calculate pH of 0.001M HCl solution.
4. What is molarity?
5. Calculate the normality of sodium carbonate, 10.6 gms of which are dissolved in 500 ml solution.
6. Calculate equivalent weight of $Al_2(SO_4)_3$, CH_3COOH , HNO_3 , $Ca(OH)_2$, H_3PO_3 , H_3PO_4 .
7. Define molecular weight.
8. Calculate pH of 0.002M HNO_3 solution.

Long Type Questions [5]

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1. How will you prepare 500 ml of 0.01M HCl solution?
2. 2 litre of a solution contains 40 gm of NaOH. Calculate the pH value of the solution.
3. 4.9 gram of Sulphuric Acid is ^{present} prepared in 500 ml of its solution having density 1.2 gm/ml. Calculate molarity & molality of the solution.
4. Calculate the molality of K_2CO_3 solution formed by dissolving 2.51 gm of it in one litre of solution. (density of soln = 0.85 gm/ml).

5. If 13.8 gms of K_2CO_3 is present in one litre of its solution, then calculate the normality & pH of the solution?
6. 20 gms of caustic soda is dissolved in water to prepare 0.5 litre of its solution, having density 1.02 gm/cc . Calculate normality, molarity & molality of the solution?
7. 10g of a dibasic acid with molecular weight 90 g/mol is present in 2 litre of its solution. Find molarity & ~~no~~ normality of the soln.
8. What is acid-base neutralisation reaction? Explain different types of such reactions.
9. Define pH. Find the pH of a solution containing 8 gm of NaOH in 2 litre of its solution.
10. Define molarity. How many grams of $BaCl_2 \cdot 2H_2O$ have been dissolved in 200ml solution of molarity 0.25 M .

Chapter-5 / Electrochemistry

- ① What is strong electrolyte? Give example.
- ② What is electrolysis?
- ③ Define electrochemical equivalent. Give relationship between electrochemical equivalent & Equivalent Mass.

LONG TYPE QUESTION [5] 7/16

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- ① State & Explain Faraday's 1st law of Electrolysis.
- ② State & Explain Faraday's 2nd law of Electrolysis.
- ③ If atomic weight of Copper is 63, then calculate the amount of copper deposited from CuSO_4 solution by passage of 0.5 ampere for 1.5 hours.
- ④ 1.35 ampere current was passed through zinc sulphate solution for 1 hour & as a result 1.64 gm of Zinc was deposited at the cathode. Calculate the equivalent mass of Zinc.
- ⑤ What is Zinc Plating? Explain

Chapter - 6

Corrosion XXXXXXXX

SHORT ANSWER TYPE [2]

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- ① Define corrosion. Give two examples.
- ② What is Galvanisation?
- ③ What is atmospheric corrosion. Give chemical formula of Rust.

LONG QUESTION TYPE [5]

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- ① Explain mechanism of Rusting of Iron.
- ② Describe Waterline Corrosion.
- ③ Explain Atmospheric Corrosion.

- ① The same quantity of electricity is passed successively through aqueous AgNO_3 & CuSO_4 solution both connected in series. The weight of silver & copper deposited at the cathodes were found to be 1.32 gm & 1.27 gm respectively. If the equivalent weight of copper is 31.75, find that of silver. [5]
- ② What is pH? Write the application of pH in Paper industries & Sugar industries. [10]
- ③ 5 litre of aqueous solution contains 19 gms of Magnesium chloride. Find molarity & normality of the solution.
- ④ How many grams of NaOH are required to prepare 1 lbs of its solution having pH 10? [5]
- ⑤ What do you mean by Cobb control in paper manufacturing process? [2]
- ⑥ 10.6 gms of washing soda dissolves in water to prepare 0.5 lbs of its solution. If the density of solution is 1.01 gm/cc, then calc normality, molarity & molality of the solution.

Chapter - 7

Metallurgy
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- ① Define (i) Ore (ii) Mineral } with example.
- ② What is Acid Flux? Give example.
- ③ What is concentration of ore?
- ④ Define — Calcination & Roasting.
- ⑤ What is Gangue?
- ⑥ Give one ore of Aluminium & Iron each.

LONG TYPE QUESTION [5] xxxxxxxxxxxxxxxxxxxx

- ① Explain Smelting process.
- ② Explain the process of — Froth Flotation.
Write short notes.
 - Leaching
 - Magnetic Separation Method
 - Gravity Separation
- ③ What do you mean by electrorefining? Explain with suitable example.
- ④ Difference between Calcination & Roasting.
- ⑤ What are flux & slag? Explain with examples.

Chapter - 8

Alloys

10/16

- ① Define alloy. [2]
- ② Define ferro & non-ferro alloys with example.
- ③ What is an Amalgam? Give example.
- ④

LONG QUESTION

- * Define alloy. Write the composition & uses of Duralmin, Alnico, Brass & Bronze. [10]

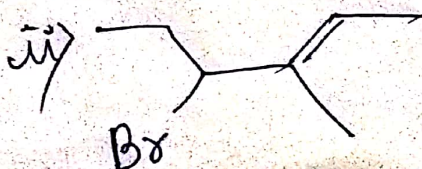
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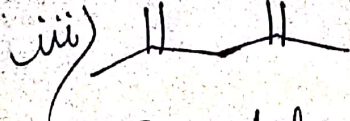
HYDROCARBONS

- ① What are saturated hydrocarbons? Give examples.
- ② What is Huckel's rule of aromaticity?
- ③ What are aromatic compounds? Give examples.

LONG TYPE

- ① What are aliphatic & aromatic hydrocarbons? Explain how Benzene is aromatic [5]
- ② Give IUPAC names / structure of following -
i) $\text{CH}_3 - \text{CCl} = \text{CBr} - \underset{\text{CH}_3}{\overset{\text{NO}_2}{\text{C}}} - \text{CH}_3$



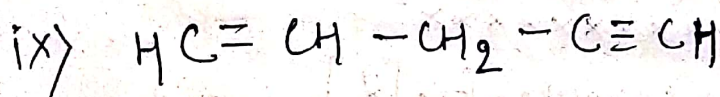
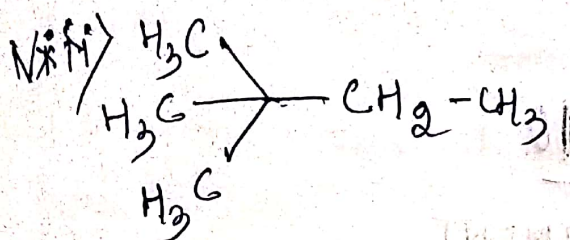
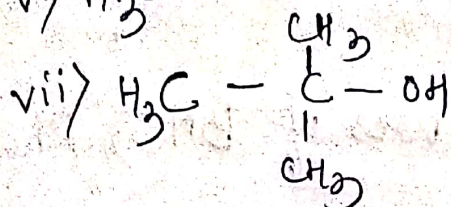
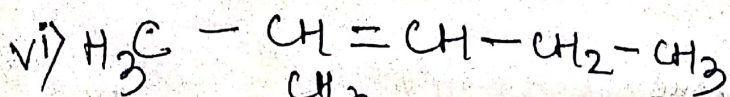


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~~iv) 3-chloro-3-ethylhex-1-en-4-yn-2-ol~~

iv) 3-chloro-3-ethylhex-1-en-4-yn-2-ol

v) tertiary butyl chloride



x) BHC

xi) Toluene

xii) Iso-pentyl chloride

xiii) 2-methyl pent-3-en-2-ol

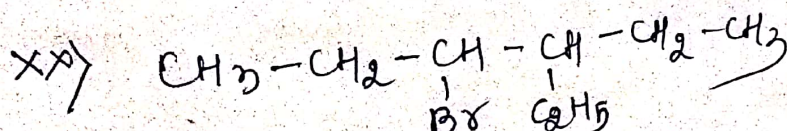
xiv) 3-bromomethyl-4-chloromethyl hexane.

xv) 3,4-dibromo-2,5-dichloro Hex-1-ene.

xvi) 2-methyl propan-2-ol.

xvii) Pent-1-en-4-yne

xviii) 3-methyl penta-1,3-diene.



XXI) Neoprene

XXII) Isoprene

XXIII) Benzene

XXIV) Phenol

XXV) Buta-1,3-diene

- ③ Give the structure & uses of BHC, Phenol & naphthalene.

Chapter-10

WATER TREATMENT XXXXXXXXXXXXXX

- ① Name any two coagulants. [2]
- ② What is the principle applied to remove the hardness of water by lime-soda process? [2]
- ③ What happens when temporary hard water is boiled? (Give equation) [2]
- ④ Mention the common units used for expressing hardness of water.
- ⑤ What are the salts responsible for the temporary & permanent hardness of water?
- ⑥ Define hard water & hardness of water.

LONG QUESTIONS

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[5]

Marks.

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- ① Give difference between cold lime soda process & hot lime soda process.
- ② What are the advantages of hot lime soda process over cold lime soda process?
- ③ How can you regenerate the exhausted ion-exchange resins?
- ④ How hardness of water is removed by limesoda process?
- ⑤ What is temporary hardness? How it can be removed?

Chapter - 11

Lubricants

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Short Type Ques [2]

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- ① Define the terms lubricants & lubrication
- ② Name the non-metal which is used as solid lubricant.
- ③ Give two functions of lubricants.
- ④ What are the component of Grease?

- ① Explain the functions of lubricants.
- ② Give the uses of Graphite, Oil & grease as lubricants.
- ③ Where are solid lubricants be used?
- ④ Where are liquid lubricants be used?
- ⑤ Under what conditions Semi-solid lubricants are preferred?

Chapter - 12

Fuels. XXXXX

- ① What is the calorific value of fuel? [2]
- ② Give two criteria of good fuel [2]
- ③ What are primary fuel & secondary fuel.
Give example.

Long Type [5] XXXXXXXX

- ① Write down the composition & uses of Producer gas & water gas. [5] + [5]
- ② Give comparison between LPG & CNG. [5]
- ③ Write the average composition & calorific value of wood & coal. [5] + [5]
- ④ Write down the average composition & calorific value of Diesel, Petrol & kerosene [5] + [5] + [5]

Chapter - 13

Polymer
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- ① Define — Polymer [2]
Monomer [2]
homopolymer [2]
Copolymer [2]
Degree of polymerisation [2]
- } with Examples

② Define elastomer [2]

③ What is the constituent of Natural Rubber.

④ What is cis-polyisoprene? Give its structural formula.

⑤ What is the main purpose of vulcanisation of rubber?

LONG TYPE ANSWER
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① Write the composition & uses of
a) Bakelite [5]
b) Polyvinyl chloride [5]

② Define elastomers. How vulcanisation of rubber takes place? [5]

③ Difference between Thermoplastic & Thermosetting Polymer [5]

④ Give composition & uses of Polyethylene & PVC. [5]

Chapter - 14

16/16

Chemicals in Agriculture

Short Question [2]

- ① What are Pesticides? Classify these. [2]
- ② What are herbicides? Give Example.

Long Type Question

- ① What are bio-fertilizers? Write used various such fertilizers.