Vidya Jyothi Institute of Technology

(An Autonomous Institution)

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Chemistry Question Bank

UNIT - I

ATOMIC & MOLECULAR STRUCTURE

LONG ANSWER QUESTIONS

1. What is meant by molecular orbital? Discuss linear combination of atomic orbital method.
2. Write energy level diagram for nitrogen and calculate the bond order.
3. Write energy level diagram for oxygen and discuss its magnetic property.
4. Discuss energy level diagram for fluorine:Calculate the bond order and its magnetic behavior.
5. Discuss pi-molecular orbital energy level diagram of 1,3-butadiene.
6. Explain pi-molecular orbital energy level diagramof benzene.
7. Discuss the salient featuresof crystal field theory.
8. Explain crystal field splitting for octahedral complexes.
9. Describe crystal field splitting for tetrahedral complexes.
10. Discuss pi-molecular orbital energy level diagram of 1,3-butadiene and benzene.

SHORT ANSWER QUESTIONS

1. What is a molecular orbital?
2. Distinguish between atomic and molecular orbital.
3. Draw the structures of 5 d-orbitals.
4. Define degeneracy.
5. What is a nodal plane?
6. What is meant by constructive and destructive interference?
7. Distinguish between sigma and pi-bond.
8. Distinguish between bonding and anti-bonding molecular orbitals.

9. What is bond order? Give its formula.
10. What is bond order? Give its significance.
11. Why He_2 molecule does not exist?
12. Why O_2 is paramagnetic?
13. Draw pi-molecular orbital energy level diagram of 1,3-butadiene.
14. Draw pi-molecular orbital energy level diagram of benzene.
15. Draw the crystal field splitting energy level diagram for octahedral complexes.
16. Draw the crystal field splitting energy level diagram for tetrahedral complexes.
17. Define crystal field splitting.
18. Calculate the bond order of oxygen molecule.
19. Calculate the bond order of nitrogen molecule.
20. Why nitrogen is diamagnetic where as oxygen is paramagnetic ?

UNIT - II

WATER TECHNOLOGY

LONG ANSWER QUESTIONS

1. How hardness of water is estimated by EDTA method?

2. Illustrate the softening of hard water using ion exchange resins with a neat labelled diagram.

3. What is brackish water? How it can be purified by reverse osmosis process?

4. Describe the various stages of purification in municipal water treatment.

5. What is alkalinity of water? How is it determined?

6. Explain internal treatment of boiler feed water in detail.

7. What is disinfection of water? Discuss various disinfection methods.

8. Numerical problems on EDTA Method.

9. Numerical problems on calculation of total, temporary and permanent hardness of water by using different amount ofhardness causing salts.

10. Define hardness.Why hardness is expressed in terms of $CaCO_3$? Distinguish between temporary and permanent hardness.

SHORT ANSWER QUESTIONS

1. Distinguish between temporary and permanent hardness.
2. Distinguish between hard and soft water.
3. Give different units of hardness. How they are interrelated?
4. Which salts are responsible for the temporary and permanent hardness?
5. Why hardness is expressed in terms of $CaCO_3$?
6. What is desalination? Give the principle of reverse osmosis.
7. Explain the role of anion exchange resin.
8. Explain the role of cation exchange resin.
9. Distinguish between internal and external treatment.
10. Write a note on internal treatment of water.
11. Distinguish between purification and softening of water.
12. Write the principle involved in EDTA method of estimating the hardness.
13. How calgon helps in preventing the scale formation?
14. Define potable water. Write down the specifications of potable water.
15. What is meant by alkalinity of water?
16. What is disinfection of water?
17. Write a note on colloidal conditioning.
18. Write a note on phosphate conditioning.
19. Mention the different stages of purification in municipal water treatment.
20. How are exhausted ion-exchange resins regenerated?

UNIT - III

Electro chemistry

LONG ANSWER QUESTIONS

1. Derive Nernst equation and give its applications.

2. What is a fuel cell? Explain the construction, working and applications of MeOH-O_2 fuel cell.

3. Explain the construction and working of a quinhydrone electrode.
4. Give the construction of lead-acid battery and write the charging and discharging reactions of lead-acid battery.
5. What is a reference electrode? Illustrate the construction and working of calomel electrode.
6. Describe the construction, working and application of lithium ion battery.
7. How can you determine the p^H of an unknown solution by using quinhydrone electrode?

SHORT ANSWER QUESTIONS

1. What is cell emf?
2. What is electrode potential?
3. Discuss the construction of galvanic cell with an example.
4. What is the role of salt bridge in an electrochemical cell?
5. Define standard oxidation potential (SOP) and standard reduction potential (SRP).
6. Distinguish between primary and secondary cells.
7. Give the advantages of fuel cells.
8. Write a note on lithium battery.
9. Define storage cell. Give the application of lead-acid cell.
10. Numerical problems on Nernst equation.
11. What is the working principle of a battery?

VIDYA JYOTHI INSTITUTE OF TECHNOLOGY

DEPARTMENT OF HUMANITIES & SCIENCES

CHEMISTRY QUESTION BANK – I Year I Semester

UNIT – III ELECTRO CHEMISTRY AND CORROSION

Short answer questions

1	Define an electrochemical cell.
2	What is electrode potential?
3	What is cell EMF?
4	Describe galvanic cell.
5	A numerical on Nernst equation.
6	What is a cell notation?
7	Differentiate primary and secondary cells.
8	What are the advantages of a fuel cell?
9	Write a note on lithium ion cells.
10	Make a note on oxidation corrosion.
11	How nature of environment affects the rate of corrosion?
12	In what way position of metal in galvanic series affect the rate of corrosion?
13	What is the basic principle involved in cathodic protection?
14	Define metallic coating.
15	What is anodic coating? Give an example.
16	What is cathodic coating? Give an example.
17	What is dry or chemical corrosion?
18	Differentiate chemical and electrochemical corrosion.
19	What is the affect of purity of metal on the rate of corrosion?
20	What are the advantages of electroless plating?

Long answer questions

1	Derive Nernst equati
2	Illustrate the construction of calomel electrode.
3	How can you determine the PH of a solution by using quinhydrone electrode?
4	Explain wet or electrochemical corrosion by evolution of hydrogen method.
5	Discuss electrochemical corrosion by absorption of oxygen method.
6	Define fuel cell. Illustrate methanol-oxygen fuel cell.
7	How corrosion controlled by sacrificial anode method.
8	Write a detailed note on impressed current cathode method.
9	Write the effect of nature of corrosion product on the rate of corrosion.
10	Explain the electroless plating in detail with the help of an example.(Ni coating on insulators)
11	What are secondary batteries? Illustrate the lead acid battery.
12	Explain Li-ion battery
13	What are fuel cells? Explain methanol-oxygen fuel cell.

UNIT-IV STEREOCHEMISTRY

Short answer questions

1	Define chirality.
2	What are enantiomers?
3	Differentiate cis and trans isomers.
4	What are diastereomers?
5	What are structural isomers?
6	State Markownikoff rule?
7	Define optical activity.
8	Differentiate SN1 and SN2 reactions.
9	What is the chemical name of aspirin?
10	Differentiate structural and stereoisomers.
11	What is anti-Markownifoff addition?
12	Write the classification of isomer.
13	Differentiate addition and reduction reactions.
14	Compare oxidation and reduction reactions.
15	What are carbonyl compounds?
16	What are stereoisomers?
17	Define configuration.
18	Write the applications of aspirin and paracetemol.
19	Write the reaction of conversion of alcohol to acid using $KMnO_4$
20	Write the reaction of conversion of acetone to isopropyl alcohol using $LiAlH_4$

Long answer questions

1	Describe conformations of n-butane.
2	Explain unimolecular nucleophilic substitution reaction in detail.
3	Write a detailed account on bimolecular nucleophilic substitution reaction.
4	Explain addition reaction.
5	Briefly make a note on oxidation of alcohol using KMnO4 and CrO3.
6	Describe elimination reactions with example.
7	What are the chemicals required in the preparation of aspirin and paracetamol? How they can be prepared?
8	Explain the reduction of carbonyl compounds by LiAlH4 and NaBH4.
9	Differentiate between enantiomers and diastereomers.
10	Explain structural isomerism in detail.

UNIT-V POLYMER CHEMISTRY

1	Define polymer and monomer.
2	What is polymerization?
3	How polymers are classified based their behavior towards heating?
4	Write down the preparation of PVC.
5	Write down the preparation of teflon.
6	What are the applications of PVC and Teflon?
7	What are fibres? How Nylon-6,6 be prepared?
8	Write down the preparation of Terylene or Dacron.
9	What is the basic unit of natural rubber?
10	Why does rubber require vulcanization?
11	Make a note on butyl rubber.
12	Write a note on various applications of conducting polymers.
13	Write down the preparation of polyhydroxy butyrate.
14	Write the preparation of polylactic acid.
15	Define elastomer.
16	What is the monomer of rubber?
17	Define vulcanization.
18	How conducting polymers are classified?
19	What is the chemical name of Teflon?
20	Expand PTFE.

Long answer questions

1	How do you classify the polymers? Explain in detail.
2	Differentiate thermoplast and thermoset polymers.
3	Write down the preparation, properties and engineering applications of Bakelite.
4	Explain vulcanization in detail.
5	Describe addition polymerization.
6	Discuss condensation polymerization.
7	What are synthetic polymers? Write down the preparation, properties and applications of Buna-S rubber.
8	What are biodegradable polymers? Discuss the preparation, properties and applications of polyglycolic acid.
9	Write a note on applications of biodegradable polymers.
10	What are conducting polymers? Explain polyacetylene in detail.