

|   |
|---|
| <b>Uka Tarsadia University (Diwaliba Polytechnic)</b> |
| <b>Diploma Chemical Engineering</b>                   |
| <b>Assignment (Basic Chemistry)</b>                   |

## **UNIT-1 CHEMICAL BONDING AND CATALYSIS**

### **Long Answer Question**

- 1) What is catalysis? Explain types of catalysis.
- 2) Discuss characteristic of covalent compounds.
- 3) Draw the structure of NaCl and CsCl.
- 4) Write down the covalent bond configuration of given compound such as Cl<sub>2</sub>, O<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub> and NH<sub>3</sub>.
- 5) Write down characteristic of ionic compound.
- 6) Write down uses of catalyst.
- 7) Explain about covalent bond.
- 8) Explain configuration of atom in metallic material.
- 9) Explain about promoter.
- 10) Explain about hydrogen bond.
- 11) Explain about positive catalyst and negative catalyst.
- 12) Explain about catalytic inhibitor.
- 13) Draw the structure of Phosphorus and Sulfur.
- 14) Write down significance of Hydrogen bond.
- 15) Explain about ionic bond.

## **UNIT-2 CONCEPTS OF ELECTRO-CHEMISTRY AND CORROSION**

### **Long Answer Question**

- 1) What is electrolyte? Write down name of electrolyte.
- 2) Explain pH meter method for the measurement of pH.
- 3) Explain pH indicator solution method for the measurement of pH.
- 4) Explain pH Paper method for the measurement of pH.
- 5) Explain measurement of pH.
- 6) Explain about electro refining with figure.

- 7) For the aqueous solution of NaOH, pH = 10, calculate the concentration of  $\text{H}_3\text{O}^+$  ion and  $\text{OH}^-$  ion of that solution.
- 8) What is electrolyte? Explain types of electrolytes.
- 9) Calculate the pH of 0.001M aqueous solution of sulfuric acid.
- 10) Write down importance of pH in various fields.
- 11) Write down application of buffer solution.
- 12) Explain ionization and degree of ionization
- 13) Calculate the pH of 0.005 N  $\text{HNO}_3$  solution.
- 14) Discuss about factor affecting on degree of ionisation.
- 15) Explain electro typing with figure.
- 16) pH of aqueous solution of HCl is 3.25, then calculate the concentration of  $\text{H}_3\text{O}^+$  ions.
- 17) Explain about types of buffer solution.
- 18) Discuss about electro plating with figure.
- 19) Calculate the pH of 0.01 M aqueous solution of NaOH at 25 °C
- 20) Discuss factors affecting on the rate of corrosion.
- 21) Explain about atmospheric corrosion with the help of diagram.
- 22) Explain any two methods to reduce the corrosion.
- 23) What is tinning? Explain in detail.
- 24) Write down the types of corrosion and explain any one.
- 25) Explain control of corrosion by modification of design and choice of material.
- 26) Discuss about crevice corrosion.
- 27) Explain anodic and cathodic protection to reduce the corrosion.
- 28) Describe pitting corrosion.
- 29) Explain galvanic method to reduce corrosion.

### **Short Answer Question.**

- 1) Define corrosion and give an example.
- 2) Define cathodic protection.
- 3) Write down the reactions for oxidation – reduction process.
- 4) What is sheradizing?
- 5) List out the name of various organic inhibitors to prevent corrosion.
- 6) What is concentration cell? Write down its types.
- 7) Explain shortly on galvanizing.
- 8) Explain shortly about metal spraying to reduce corrosion.
- 9) Discuss shortly on metal cladding for the prevention of corrosion.
- 10) Explain shortly about the effect of temperature on the rate of corrosion.

## UNIT-3 WATER TREATMENT

### Short Answer Questions

- 1) How to prevent caustic embrittlement?
- 2)  $1 \text{ ppm} = \text{_____}^{\circ}\text{French} = \text{_____}^{\circ}\text{Clark}$ .
- 3) Write down the name of permutit used in permutit process.
- 4) Write down the name of ingredient in hard water.
- 5) Define parts per million (ppm).
- 6) Calculate the molecular weight of  $\text{Ca}(\text{HCO}_3)_2$ . (Ca=40, H=1, C=12, O=16)
- 7) Total hardness of water = \_\_\_\_\_ + \_\_\_\_\_ .
- 8) For water  $1 \text{ ppm} = \text{_____} \text{ mg/l}$
- 9) Write down the advantages of permutit process.
- 10) Define: Hard water and soft water.
- 11) Which methods are involved to express hardness of water?
- 12) Write down the disadvantages of ion exchange process.
- 13) What is temporary hardness.
- 14) Write down the treatments to reduce the foaming.
- 15) Draw the sketch of the filtration process for treatment of water.

### Long Answer Question

- 1) Discuss treatment to prevent scale formation in the boiler.
- 2) Explain Soda – Lime process.
- 3) If the hardness of water sample is  $30^{\circ}\text{French}$  then find out hardness of water in ppm and degree Clark.
- 4) Explain about permutit process.
- 5) Amount of salt component are present following  
 $\text{Ca}(\text{HCO}_3)_2 = 243 \text{ mg/Lit}$ ,  $\text{Mg}(\text{HCO}_3)_2 = 146 \text{ mg/Lit}$ ,  $\text{CaCl}_2 = 11.1 \text{ mg/Lit}$ .,  $\text{MgCl}_2 = 9.5 \text{ mg/Lit}$ ,  $\text{MgSO}_4 = 12 \text{ mg/Lit}$ . Calculate temporary hardness of water.
- 6) Discuss about reverse osmosis process.
- 7)  $\text{Ca}(\text{HCO}_3)_2 = 16.2 \text{ mg/Lit}$ ,  $\text{Mg}(\text{HCO}_3)_2 = 14.6 \text{ mg/Lit}$ ,  $\text{MgSO}_4 = 12 \text{ mg/Lit}$ . Calculate permanent hardness of water.
- 8) Discuss about caustic embrittlement.
- 9) Write down the problems due to the formation of scale and sludge in the boiler.
- 10) Write down the short note on chlorination of water.
- 11) Write down the problems due to foam.
- 12) Discuss about sedimentation.
- 13) Amount of salt component are present following  
 $\text{Ca}(\text{HCO}_3)_2 = 8.1 \text{ mg/Lit}$ ,  $\text{Mg}(\text{HCO}_3)_2 = 29.2 \text{ mg/Lit}$ ,  $\text{CaCl}_2 = 11.1 \text{ mg/Lit}$ .,  $\text{MgSO}_4 = 6 \text{ mg/Lit}$ . Calculate temporary hardness of water.
- 14) Explain EDTA method to measure the hardness of water.
- 15) Discuss ion exchange process.

## UNIT-4 SURFACE CHEMISTRY

### Long Answer Question

- 1) Write down type of Colloid.
- 2) Write down the examples of foam colloid.
- 3) Draw the neat sketch of breeding arc method.
- 4) Classify process for manufacturing of Lyophobic sol.
- 5) Write down name of different colloidal solution.
- 6) Write down examples of gel.
- 7) Write down types of emulsion.
- 8) Write down examples of macromolecular colloid.
- 9) Define: 1) Adsorbate, 2) Adsorbent.
- 10) Explain Brownian Motion.
- 11) Give classification of solution.
- 12) What are uses of colloid?
- 13) Write down the examples of solid colloidal sol.
- 14) Write down examples of aerosol.
- 15) Write down difference between physical adsorption and chemical adsorption.
- 16) Explain Tyndall effect.
- 17) Give classification of colloidal solution.
- 18) Classify adsorption.
- 19) Draw neat sketch of colloidal mill.
- 20) Draw the table of different colloid.
- 21) Give name of important properties of colloid
- 22) Differentiate between lyophilic and lyophobic sol.
- 23) Discuss mechanism of micelle formation.
- 24) Explain mechanical dispersion for preparation of colloidal sol.
- 25) Give short explanation of Adsorption.

## UNIT-5 PROPERTIES OF LIQUID AND STANDARD SOLUTION

### Long Answer Question

- 1) Write down name of method to determine surface tension.
- 2) Draw neat sketch of any one viscometer.
- 3) What is parachor ?
- 4) Define: 1) Melting Point, 2) Boiling Point.
- 5) What is density? Write down its unit.
- 6) Write down unit of surface tension in CGS and SI System.
- 7) Write down the name of the method for determination of viscosity.
- 8) Write down the equation for measurement of surface tension.
- 9) Write down the material required for the measurement of viscosity.
- 10) Explain constitutive properties.

- 11) Explain about refractive index.
- 12) Write down melting point and boiling point of water.
- 13) Write down the equation for measurement of viscosity.
- 14) Draw the neat sketch of stalagmometer.
- 15) Write down the name of equipment used for measurement of refractive index and surface tension.
- 16) Explain viscosity measurement by ostwald's viscometer.
- 17) Write down the name of physical properties of liquid.
- 18) Write down material required for the measurement of surface tension.
- 19) Discuss about parachor.
- 20) Explain about viscosity.
- 21) Define: 1) Solvent, 2) Solution, 3) Molecular Weight
- 22) 10 gm of sulphuric acid is to be dissolved into the water to make 2 lit of Sulphuric Acid Solution. Calculate the Normality of Sulphuric Solution.
- 23) Define: 1) Normality, 2) Molarity, 3) Solute.
- 24) 3 gm of NaOH is to be dissolved in water to produce 2 liter of aqueous solution of NaOH. Find out normality of NaOH solution.
- 25) What is equivalent weight? Write down formula for equivalent weight.
- 26) Explain % W/W method
- 27) 6 gm of HCl is to be dissolved in water to produce 1 liter of aqueous solution of HCl. Find out normality of HCl solution.
- 28) Explain % W/V method
- 29) 5 gm of Sodium hydroxide is to be dissolved into the water to make 1 lit of sodium hydroxide solution. Calculate the Normality of Sodium hydroxide Solution.
- 30) Explain % V/V method.
- 31) 2 gm of NaOH is to be dissolved into the water to make 1 lit of NaOH Solution. Calculate the Normality of NaOH Solution
- 32) 2 gm of sulphuric acid is to be dissolved into the water to make 1 lit of Sulphuric Acid Solution. Calculate the Normality of Sulphuric Solution.

## **UNIT-6 BASIC CONCEPT AND METHODS OF ANALYSIS:**

### **Long Answer Question**

- 1) Discuss shortly about calomel electrode
- 2) Write down the limitation of Glass electrode
- 3) Explain shortly about glass electrode.
- 4) Write down the limitation of Hydrogen electrode
- 5) Discuss shortly about potentiometry titration.

- 6) What is volumetric analysis? Write down formula to determine volumetric analysis.
- 7) Explain shortly about Hydrogen electrode.
- 8) Write down classification of Chromatography.
- 9) Write down the name of method used for quantitative analysis.
- 10) What is electrical conductivity and thermal conductivity?
- 11) Explain shortly about Paper chromatography.
- 12) Discuss shortly about redox titration.
- 13) Define : 1) Qualitative analysis, 2) Quantitative analysis
- 14) Write down material used for acid base titration.
- 15) Draw the figure of Gas Chromatography.
- 16) What is redox titration? Write down any one reaction shows redox titration.
- 17) Explain shortly about Acid Base Titration.
- 18) Write down the list of material used for paper chromatography.
- 19) Write down the name of various titration method.
- 20) Write down material used in gas chromatography.
- 21) Write down importance of volumetric analysis.