

CY8151 Engineering Chemistry

Important 13 Marks Questions

Part-B

Unit-I

1. What is hard water? Highlight its disadvantages?
2. Explain the mechanism of ion exchange process of water treatment.
3. Explain the reverse osmosis process and its advantages.
4. What are internal treatments? Explain any two of them.
5. As water sample is alkaline to both phenolphthalein as well as methyl orange 100ml of the water sample on titration with N/50 HCl required 4.7ml of the acid to phenolphthalein end point. When a few drops of methyl orange are added to the same solution just the titration was further continued till the yellow color of the solution just turned red after the addition of another 10.5ml of the acid solution. Elucidate on the type and extent of alkalinity present in the water sample.
6. Compare zeolite process with lime-soda process in water treatment.
7. What are the essential requirements of boiler feed water?
8. What are the various boiler troubles and how they are prevented?
9. Write the difference between internal and external treatment of boilers.
10. Discuss the various methods available for internal conditioning.
11. Calculate total hardness of the given sample water which contains the following in ppm. $\text{CaCl}_2 = 111$; $\text{CaSO}_4 = 136$; MgCl_2 and $\text{MgCO}_3 = 144$.
12. How are sludge and scale formed? Write briefly about their prevention and disadvantages.
13. Describe ion exchange process and explain the reactions involved in it.
14. Write note on
 - i) Phosphate conditioning.
 - ii) Sodium aluminate conditioning.
15. Explain ion exchange process.

Unit-II

1. Derive and explain the Langmuir adsorption isotherm.
2. Write down the difference between physisorption and chemisorption.

3. Discuss the general characteristics of catalytic reactions.
4. Derive Michaelis-Menten equation of enzyme catalysis.
5. What is an adsorption isotherm? Draw the five general types of adsorption isotherm mathematically.
6. Give any four applications of adsorption.
7. Discuss various factors which affects the adsorption of gas on a solid adsorbent.
8. Explain a) Catalytic poisoning
b) Catalytic promoters.
9. Explain the types of adsorption.
10. Explain enzyme catalysis.
11. Explain unimolecular reactions.
12. Explain the acid base catal applications.
13. Derive the Langmuir adsorption isotherm. Also explain the mechanism with various cases
14. What is a catalyst? What are its types? Derive the Michaelis Menten equation.
15. Explain catalytic poisoning.

Unit-III

1. Deduce and explain the lead silver phase diagram.
2. What are the significance of alloying?
3. Explain the phase diagram of water in detail
4. Differentiate between hardening and nitriding heat treatment processes.
5. What do you mean by heat treatment of alloys? Discuss its advantages and various processes.
6. Draw and explain the phase diagram of Pb-Ag eutectic system.
7. With two cooling curves for pure substance and mixture, discuss briefly about thermal analysis.
8. Write notes on any two types of heat treatment of steel.
9. Mention the composition and uses of a) Nichrome b) Stainless steel
10. State phase rule and explain the terms involved in it.
11. Draw and label the phase diagram of lead-silver system. Explain.
12. Explain the properties and significance of alloys.
13. Explain the one component water system with a phase diagram. Explain the system using phase rule.

14. Draw the lead silver phase diagram and explain using phase rule. Also explain the Pattinson process.
15. What is condensed phase rule? What is the number of degrees of freedom at the eutectic point?

Unit-IV

1. How are fuels classified? Give examples for each of them.
2. Distinguish between ultimate and proximate analyses.
3. Explain the functioning of Orsat's apparatus.
4. Write about LPG, its uses, advantages and disadvantages.
5. Give a detailed procedure of determination of various elements present in coal (Ultimate analysis)
6. Describe the Synthesis of metallurgical coke by Otto-Hoffman's by product oven method and explain how various by products are recovered.
7. With a neat diagram of Orsat's apparatus, explain the analysis of flue gas.
8. What is ultimate analysis of coal? Give its significance.
9. How is proximate analysis of coal carried out? Mention its significance.
10. Explain a) Octane number and b) Cetane number. How can they be improved?
11. How is the analysis of flue gas done? Explain with a neat diagram.
12. What is calorific value? What are its types? Explain.
13. Neatly draw a schematic diagram of the Orsat apparatus and explain the steps involved in the flue gas analysis.
14. b) Distinguish between:
 - i) High and low calorific values
 - ii) Coal and coke
15. Distinguish between Proximate and ultimate analysis.

Unit-V

1. Explain the working of a hydrogen oxygen fuel cell.
2. Distinguish between nuclear fission and nuclear fusion.
3. Write notes on the working of a breeder reactor.
4. Explain the working of a lead acid battery.
5. a) What are fuel cells? Briefly describe about hydrogen-oxygen fuel cell.
b) what are the advantages of Li Battery?
6. Write anode and cathode and over all cell reactions of

- i) Lead acid storage cell and
 - ii) Lithium battery.
7. Explain the construction, charging and discharging of lead acid accumulator.
 8. What are the components of a nuclear power reactor and explain the functioning of light water nuclear power reactor with a neat diagram?
 9. Describe the Ni-Cd cell with reactions.
 10. Construct a lead acid battery and explain.
 11. Explain the types of batteries with neat diagram.
 12. Derive the nuclear chain reaction.
 13. Explain the differences between nuclear fission and fusion reactions.
 14. With a neat diagram, explain the working of a breeder reactor.
 15. Explain the working principle involved in the conversion of solar energy and wind energy as useful energy.

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