CBSE Test Paper-02

Class - 12 Chemistry (Surface Chemistry)

1. The physical adsorption is due to
   a. Vander waal's forces
   b. Strong electrostatic forces of attraction
   c. Hydrogen bonding
   d. Covalent bond
2. The average molecular mass of colloidal can be determined by
   a. Tyndall effect
   b. Flocculation value
   c. Brownian movement
   d. Osmotic pressure measurement
3. Which catalyst is used in contact process?
   a. Molybdenum
   b. Vanadium pentoxide
   c. Platinum
   d. Iron
4. Which is correct in case of Van der waal adsorption?
   a. High temperature, high pressure
   b. Low temperature, high pressure
   c. Low temperature, low pressure
   d. High temperature, low pressure
5. The adsorbent used in decolouration of vinegar and sugar solution is
   a. Activated carbon
   b. Oxygen
   c. Alumina gel
   d. Silica gel
6. What is the function of emulsifying agent?
7. Which type of forces are involved in the process of physisorption?
8. What are the signs of ΔH and ΔS when gas is absorbed by an adsorbent?

9. Physical adsorption is multilayered, while chemisorption is monolayered. Why?
10. Write the characteristics of enzyme catalysed reactions.
11. Name the two types of adsorptions.
12. How does chemisorption of a gas on a solid vary with temperature?
13. Why is the ester hydrolysis slow in the beginning and becomes faster after some time?
14. Write a short notes on associated colloids and micelles. How associated colloids are different from multimolecular and macromolecular colloids?
15. Compare physical adsorption and chemical adsorption in terms of rate and prevailing temperature.

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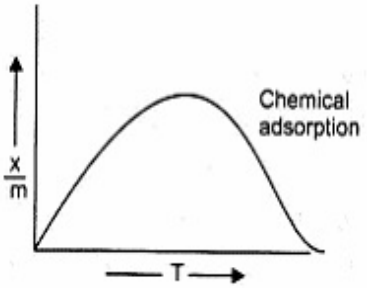
Solutions

1. a. Vander waal's forces
   Explanation: If the force of attraction between adsorbent and adsorbate is weak van der Waals force, then it is called physical adsorption or physisorption.
2. d. Osmotic pressure measurement
   Explanation: Average molecular mass of colloidal solution is determined by Osmotic Pressure measurement.
3. b. Vanadium pentoxide
   Explanation: V_2O_5 is used as catalyst in contact process .
4. b. Low temperature, high pressure
   Explanation: Physisorption is favoured only at low temperature and high pressure.
5. a. **Activated carbon**
   Explanation: It adsorbs the colour in solutions.
6. Emulsifying agent is a substance which stabilizes emulsions.
7. Physisorption involves weak Van der Waals forces.
8. Adsorption is exothermic in nature, so ΔH is always negative (ΔH < 0). Here adsorption entropy of adsorbate decrease, so ΔS is also negative.
9. As physical adsorption, involves only weak van der waals force of interaction, so many layers of adsorbate get attached while chemisorption involves chemical bond formation between adsorbent and adsorbate, so only monolayer formation occurs.
10. The characteristics of enzyme catalysed reactions are:
    i. They are highly efficient and specific in nature.
    ii. They have maximum activity under optimum temperature and pH.
    iii. Their activity increases on adding activators and co-enzymes while decreases in

the presence of poisons or inhibitors.

11. Two types of adsorption are:
    i. Physical adsorption or physisorption.
    ii. Chemical adsorption or chemisorption.

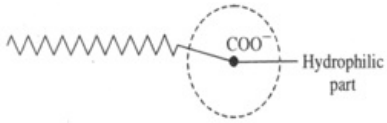
12. In chemisorption, firstly it increases with increases in temperature and then decreases if the pressure remains constant.



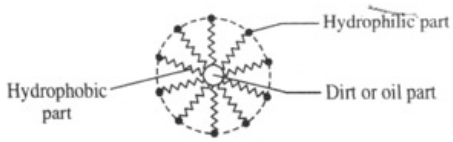
13. The ester hydrolysis takes place as follows:
$$\underset{Ester}{RCOOR'} + \underset{Water}{H_2O} \rightleftharpoons \underset{Acid}{RCOOH} + \underset{Alcohol}{R'OH}$$
The acid produced in the reaction acts as catalyst (autocatalyst) for the reaction. Hence, the reaction becomes faster after some time.

14. Certain substances behave as normal electrolytes, when they are present at low concentration, but they form an aggregates of colloidal dimension, when they are present at high concentration. Such colloids are known as associated colloids and these aggregated particles are known as micelles. Example : Soaps and detergents. They differ from multimolecular and macromolecular colloids as they behave as normal electrolyte at low concentration while become colloids at higher concentration due to the formation of micelles. Multimolecular and macromolecular colloids behave like colloids at lower as well as at higher concentration.
Micelles: The aggregated particles formed by normal electrolytes when they are taken in high concentration are known as micelles. Micelle is formed by the association of small particles. For example, soaps contain sodium salt of higher fatty acids, i.e., sodium stearate or sodium oleate.
$$\underset{Soap}{RCOONa} \rightarrow RCOO^- + Na^+$$
R = long carbon chain of more than 10 carbons.
If soaps are present at low concentration, they will behave like an electrolyte, but if the concentration is higher, then the negative ions (Stearate or oleate ions) make the

aggregates through their hydrophobic parts (carbon chain), i.e., COO^- end and the hydrophilic part would be in contact with solvent.



(*a*) Anion of soaps



(*b*) Formation of micelle

The formation of micelle requires certain minimum concentration that known as critical micelle concentration (CMC).

15. i. Physical adsorption takes place usually at low temperature. To the contrary chemical adsorption takes place at relatively high temperature.

ii. Physical adsorption takes place with an appreciably good rate. The later increases with rise in temperature.

The chemical adsorption takes place with a pretty good rate with rise in temperature. After a limit its rate decrease with rise in temperature.