

Ankit Gupta Classes



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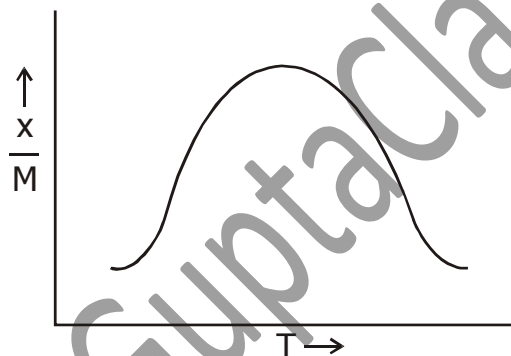
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UNIT—5

SURFACE CHEMISTRY AND CATALYSIS

1 MARK QUESTIONS

Q. 1. What kind of adsorption is represented by the following graph :



Ans. Chemisorption.

Q. 2. In the titration of oxalic acid by acidified KMnO_4 , the oxidation of oxalic acid is slow in the beginning but becomes fast as the reaction progresses. Why ?

Ans. Autocatalysis by Mn^{+2} .

Q. 3. Out of PO_4^{3-} , SO_4^{2-} , Cl^- , which will act as the best coagulating agent for $\text{Fe}(\text{OH})_3$?

Ans. PO_4^{3-} .

Q. 4. Arrange the following in correct order of their coagulating power :

Na^+ , Al^{3+} , Ba^{2+}

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Ans. $\text{Na}^+ < \text{Ba}^{2+} < \text{Al}^{3+}$

Q. 5. Which type of charged particles are adsorbed on the surface of As_2S_3 during its preparation ?



Ans. S^{2-} .

Q. 6. Which type of metals act as effective catalysts ?

Ans. Transition metals.

Q. 7. The colloidal solution of gold prepared by different methods have different colours. Why ?

Ans. Due to difference in the size of colloidal particles.

Q. 8. At high pressure, the entire metal surface gets covered by a mono molecular layer of the gas. What is the order of the process ?

Ans. Zero order.

Q. 9. What is the term used for minimum concentration of an electrolyte which is able to cause coagulation of a sol ?

Ans. Flocculation value.

Q. 10. A liquid is found to scatter a beam of light but leaves no residue when passed through the filter paper. What can the liquid be described as ?

Ans. Colloid.

Q. 11. If an electric field is applied to a colloidal sol, the dispersed phase particles are found to move towards the electrode of opposite charge. If however, the dispersed phase is made stationary, the dispersion medium is found to move in the opposite direction. What is the term used for such movement of dispersion medium ?

Ans. Electro osmosis.

Q. 12. Out of glucose, urea and dodecyl trimethyl ammonium chloride, which one forms micelles in aqueous solution above certain concentration ?

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Ans. Dodecyl trimethyl ammonium chloride.

Q. 13. A plot of \log versus $\log p$ for the adsorption of a gas on a solid gives a straight line. What is the slope equal to ?

Ans. $\frac{1}{n}$

Q. 14. The formation of micelles occurs only beyond a certain temperature. What is the temperature called ?

Ans. Kraft temperature

Q. 15. What are the signs of ΔH , ΔS and ΔG for the process of adsorption ?

Ans. $\Delta H = -ve$

$\Delta S = -ve$

$\Delta G = -ve$

Q. 16. Out of CO and NH_3 which is adsorbed on activated charcoal to a large extent and why ?

Ans. Ammonia; because more easily liquefiable gas undergoes adsorption to a greater extent.

Q. 17. On passing H_2S through dilute HNO_3 the colourless solution becomes turbid. Why ?

Ans. Due to formation of colloidal sol of Sulphur.

Q. 18. A sol is prepared by addition to excess $AgNO_3$ solution in KI solution. What charge is likely to develop on the colloidal particles ?

Ans. Positive.

Q. 19. If we add equimolar amounts of ferric hydroxide sol and arsenic sulphide sol, what will happen ?

Ans. Both the sols will get coagulated.

Q. 20. What happens when freshly precipitated $Fe(OH)_3$ is shaken with a little amount of dilute solution of $FeCl_3$?

Ans. It causes peptization leading to the formation of a positively charged sol of $Fe(OH)_3$.

Q. 21. What happens to a gold sol if gelatin is added to it ?

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Ans. It causes stabilisation of gold sol.

Q. 22. Out of NaCl , MgSO_4 , $\text{Al}_2(\text{SO}_4)_3$, $\text{K}_4[\text{Fe}(\text{CN})_6]$, which one will bring about the coagulation of a gold sol quickest and in the least of concentration ?

Ans. $\text{Al}_2(\text{SO}_4)_3$.

Q. 23. What is the unit for expressing flocculation value ?

Ans. millimole per litre.

Q. 24. Out of PO_4^{3-} , SO_4^{2-} , Al^{3+} and Na^+ , which will have the highest coagulating power for As_2S_3 colloid ?

Ans. Al^{3+} .

2 MARKS QUESTIONS

Q. 1. Bleeding is stopped by the application of alum to a wound. Why ?

Ans. Blood is a colloid alum being an electrolyte, makes the blood to coagulate and form clot.

Q. 2. What is the purpose of adding gelatin to ice cream ?

Ans. Ice cream is a colloid. Gelatin imparts stability to it because gelatin is a protective colloid.

Q. 3. Dialysis is a method of purification of sols. But prolonged dialysis of the sol makes it unstable. Why ?

Ans. Traces of electrolytes in the sol, impart charge to dispersed phase particles making it stable. Prolonged dialysis removes all electrolytes thus making the sol unstable.

Q. 4. What is the function of gum arabic in the preparation of Indian ink ?

Ans. Gum arabic is a protective colloid and thus provides stability to Indian ink.

Q. 5. What is collodion ? What is its use ?

Ans. Cellulose dispersed in ethanol, is called collodion. It is used for making membranes for ultrafiltration.

Q. 6. Why the sun looks red at the time of setting ? Explain on the basis of colloidal properties.

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Ans. At the time of setting, the sun is at the horizon. The light emitted by the sun has to travel a longer distance through the atmosphere. As a result, blue part of the light is scattered away by the dust particles in the atmosphere. Hence the red part is visible.

Q. 7. Addition of H_2 to acetylene gives ethane in presence of palladium but if $BaSO_4$ and quinoline or sulphur are also added, the product is ethane. Why ?

Ans. $BaSO_4$ + quinoline / s poison the catalyst. Hence, the efficiency of the catalyst decreases and the reaction stops at the first stage of reduction.

Q. 8. SnO_2 forms a positively charged colloidal sol in acidic medium and a negatively charged sol in the basic medium. Why ?

Ans. SnO_2 is amphoteric in nature. It reacts with acid eg. HCl to form $SnCl_4$ in the solution. The common Sn^{4+} ions are adsorbed on the surface of SnO_2 particles giving them a positive charge.

SnO_2 reacts with a base eg. $NaOH$ to form Sodium Stannate in the solution. The stannate ions are adsorbed on the surface of SnO_2 particles giving them a negative charge.

Q. 9. Why physical adsorption is multimolecular whereas chemisorption is unimolecular ?

Ans. Chemisorption takes place as a result of reaction between adsorbent and adsorbate. When the surface of the adsorbent is covered with one layer, no further reaction can take place.

Physical adsorption is simply by Vander Waal's forces. So any number of layers may be formed one over the other on the surface of the adsorbent.

Q. 10. What is meant by induced catalysis ? Give an example.

Ans. It is a phenomenon in which a chemical reaction increases the rate of another reaction which otherwise may not occur in similar conditions.

Eg. Sodium arsenite (Na_3AsO_3) is not oxidised in air but if air is blown into a solution containing Na_3AsO_3 and Na_2SO_3 , then both AsO_3^{3-} and SO_3^{2-} ions are oxidised.

Q. 11. What type of colloidal sols are formed in the following ?

- (i) Sulphur vapours are passed through cold water.
- (ii) White of an egg is mixed with water.
- (iii) Concentration of soap solution is increased.

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- Ans.** (i) Multimolecular colloid
(ii) Macromolecular colloid
(iii) Associated colloid.

Q. 12. What is common to aquasol and aerosol ? In what respect do they differ ?

Ans. Both are colloids.

In aquasol, water acts as dispersion medium.

In aerosol, air acts as dispersion medium.

Q. 13. Explain as to why SnO_2 forms a positively charged sol in solutions with $\text{pH} < 7$ and negatively charged sol in solutions with $\text{pH} > 7$.

Ans. Refer Ans. 8.

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