



GURUKUL FOR JEE & NEET

DPP - Daily Practice Problems

Chapter-wise Sheets

Date : Start Time : End Time :

CHEMISTRY (CC19)

SYLLABUS : Surface Chemistry

Max. Marks : 180

Marking Scheme : + 4 for correct & (-1) for incorrect

Time : 60 min.

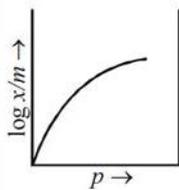
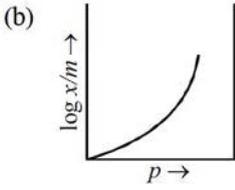
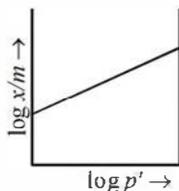
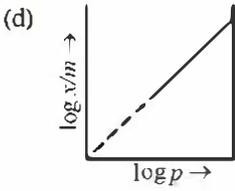
INSTRUCTIONS : This Daily Practice Problem Sheet contains 45 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.

- Which of the following statements is *not* true about the oil-in-water type emulsion?
 - On addition of small amount of water, no separate layer of water appears
 - On addition of oil, separate layer of oil is formed
 - Addition of an electrolyte causes the conductivity of the emulsion to increase
 - Addition of small amount of oil soluble dye renders the entire emulsion coloured.
- Which of the following is **not** a favourable condition for physical adsorption ?
 - High pressure
 - Negative ΔH
 - Higher critical temperature of adsorbate
 - High temperature
- The disperse phase in colloidal iron (III) hydroxide and colloidal gold is positively and negatively charged, respectively. Which of the following statements is NOT correct ?
 - Coagulation in both sols can be brought about by electrophoresis
 - Mixing the sols has no effect
 - Sodium sulphate solution causes coagulation in both sols
 - Magnesium chloride solution coagulates, the gold sol more readily than the iron (III) hydroxide sol
- Among the following, correct statement is :
 - Brownian movement is more pronounced for smaller particles than for bigger-particles.
 - Sols of metal sulphides are lyophilic.
 - Hardy Schulze law states that bigger the size of the ions, the greater is its coagulating power.
 - One would expect charcoal to adsorb chlorine more than hydrogen sulphide.

RESPONSE GRID

1. (a)(b)(c)(d) 2. (a)(b)(c)(d) 3. (a)(b)(c)(d) 4. (a)(b)(c)(d)

Space for Rough Work

5. One desires to prepare a positively charged sol of silver iodide. This can be achieved by
 (a) adding small amount of AgNO_3 solution to KI solution in slight excess
 (b) adding small amount of KI solution to AgNO_3 solution in slight excess
 (c) mixing equal volumes of equimolar solutions of AgNO_3 and KI
 (d) None of these
6. How many layers are adsorbed in chemical adsorption?
 (a) One (b) Two
 (c) Many (d) Zero
7. Adsorption of gases on solid surface is exothermic reaction because
 (a) free energy increases (b) enthalpy is positive
 (c) entropy increases (d) enthalpy is negative
8. Cod Liver oil is
 (a) fat dispersed in water (b) water dispersed in fat
 (c) water dispersed in oil (d) fat dispersed in fat.
9. Physical adsorption of a gaseous species may change to chemical adsorption with _____
 (a) decrease in temperature
 (b) increase in temperature
 (c) increase in surface area of adsorbent
 (d) decrease in surface area of adsorbent
10. Hydrolysis of urea is an example of
 (a) homogenous catalysis (b) heterogenous catalysis
 (c) biochemical catalysis (d) zeolite catalysis
11. Alum helps in purifying water by
 (a) forming Si complex with clay particles
 (b) sulphate part which combines with the dirt and removes it
 (c) aluminium which coagulates the mud particles
 (d) making mud water soluble
12. The efficiency of an enzyme in catalysing a reaction is due to its capacity
 (a) to form a strong enzyme-substrate complex
 (b) to decrease the bond energies of substrate molecule
 (c) to change the shape of the substrate molecule
 (d) to lower the activation energy of the reaction
13. Tyndall effect is shown by
 (a) sol (b) solution
 (c) plasma (d) precipitate
14. The cause of Brownian movement is
 (a) Heat changes in liquid state
 (b) Convective currents
 (c) The impact of molecules of the dispersion medium on the colloidal particles.
 (d) Attractive forces between the colloidal particles and molecules of dispersion medium.
15. Which of the following curves is in accordance with Freundlich adsorption isotherm?
 (a)  (b) 
 (c)  (d) 
16. Which of the following kind of catalysis can be explained by the adsorption theory?
 (a) Homogeneous catalysis
 (b) Acid - base catalysis
 (c) Heterogeneous catalysis
 (d) Enzyme catalysis
17. The electrolytic impurities of a sol can most easily be separated by
 (a) dialysis (b) electrosmosis
 (c) electrophoresis (d) electro dialysis
18. Which of the following constitutes irreversible colloidal system in water as dispersion medium?
 (a) Clay (b) Platinum
 (c) $\text{Fe}(\text{OH})_3$ (d) All of these

RESPONSE
GRID

5. (a) (b) (c) (d) 6. (a) (b) (c) (d) 7. (a) (b) (c) (d) 8. (a) (b) (c) (d) 9. (a) (b) (c) (d)
 10. (a) (b) (c) (d) 11. (a) (b) (c) (d) 12. (a) (b) (c) (d) 13. (a) (b) (c) (d) 14. (a) (b) (c) (d)
 15. (a) (b) (c) (d) 16. (a) (b) (c) (d) 17. (a) (b) (c) (d) 18. (a) (b) (c) (d)

Space for Rough Work

19. If x is amount of adsorbate and m is amount of adsorbent, which of the following relations is not related to adsorption process ?
 (a) $x/m = f(p)$ at constant T .
 (b) $x/m = f(T)$ at constant p .
 (c) $p = f(T)$ at constant (x/m) .
 (d) $\frac{x}{m} = p^n T$
20. Gold numbers of some colloids are : Gelatin : 0.005 – 0.01, Gum arabic : 0.15 – 0.25; Olcate : 0.04 – 1.0; Starch : 15 – 25. Which among these is a better protective colloid ?
 (a) Gelatin (b) Starch
 (c) Olcate (d) Gum arabic
21. Colloidal gold is prepared by
 (a) Mechanical dispersion (b) Peptisation
 (c) Bredig's Arc method (d) Hydrolysis
22. Freundlich equation for adsorption of gases (in amount of x g) on a solid (in amount of m g) at constant temperature can be expressed as
 (a) $\log \frac{x}{m} = \log p + \frac{1}{n} \log K$ (b) $\log \frac{x}{m} = \log K + \frac{1}{n} \log p$
 (c) $\frac{x}{m} \propto p^n$ (d) $\frac{x}{m} = \log p + \frac{1}{n} \log K$
23. Given below, catalyst and corresponding process/reaction are matched. The one with mismatch is
 (a) $[\text{RhCl}(\text{PPh}_3)_2]$: Hydrogenation
 (b) $\text{TiCl}_4 + \text{Al}(\text{C}_2\text{H}_5)_3$: Polymerization
 (c) V_2O_5 : Haber-Bosch process
 (d) Nickel : Hydrogenation
24. Which of the following does not contain a hydrophobic structure ?
 (a) Linseed oil (b) Lanolin
 (c) Glycogen (d) Rubber
25. The heats of adsorption in physisorption lie in the range (in kJ/mol)
 (a) 40-400 (b) 40- 100
 (c) 10-40 (d) 1- 10
26. Which one of the following characteristics is **not** correct for physical adsorption ?
 (a) Adsorption increases with increase in temperature
 (b) Adsorption is spontaneous
 (c) Both enthalpy and entropy of adsorption are negative
 (d) Adsorption on solids is reversible
27. Under ambient conditions, which among the following surfactants will form micelles in aqueous solution at lowest molar concentration?
 (a) $\text{CH}_3-(\text{CH}_2)_8-\text{COO}^- \text{Na}^+$
 (b) $\text{CH}_3(\text{CH}_2)_{11} \text{N}^+(\text{CH}_3)_3 \text{Br}^-$
 (c) $\text{CH}_3-(\text{CH}_2)_{13}-\text{OSO}_3^- \text{Na}^+$
 (d) $\text{CH}_3(\text{CH}_2)_{15} \text{N}^+(\text{CH}_3)_3 \text{Br}^-$
28. Flocculation value of BaCl_2 is much less than that of KCl for sol A and flocculation value of Na_2SO_4 is much less than that of NaBr for sol B. The correct statement among the following is :
 (a) Both the sols A and B are negatively charged.
 (b) Sol A is positively charged and Sol B is negatively charged.
 (c) Both the sols A and B are positively charged.
 (d) Sol A is negatively charged and sol B is positively charged.
29. The density of gold is 19 g/cm^3 . If $1.9 \times 10^{-4} \text{ g}$ of gold is dispersed in one litre of water to give a sol having spherical gold particles of radius 10 nm, then the number of gold particles per mm^3 of the sol will be
 (a) 1.9×10^{12} (b) 6.3×10^{14}
 (c) 6.3×10^{10} (d) 2.4×10^6
30. The stability of lyophilic colloids is due to which of the following?
 (a) Charge on their particles (b) Large size of their particles
 (c) Small size of their particles
 (d) A layer of dispersion medium
31. Colloid of which one of the following can be prepared by electrical dispersion method as well as reduction method ?
 (a) Sulphur (b) Ferric hydroxide
 (c) Arsenious sulphide (d) Gold
32. Example of intrinsic colloid is
 (a) glue (b) sulphur
 (c) Fe (d) As_2S_3

RESPONSE

GRID

19. (a) (b) (c) (d)	20. (a) (b) (c) (d)	21. (a) (b) (c) (d)	22. (a) (b) (c) (d)	23. (a) (b) (c) (d)
24. (a) (b) (c) (d)	25. (a) (b) (c) (d)	26. (a) (b) (c) (d)	27. (a) (b) (c) (d)	28. (a) (b) (c) (d)
29. (a) (b) (c) (d)	30. (a) (b) (c) (d)	31. (a) (b) (c) (d)	32. (a) (b) (c) (d)	

Space for Rough Work

33. A particular adsorption process has the following characteristics : (i) It arises due to van der Waal's forces and (ii) it is reversible. Identify the correct statement that describes the above adsorption process :
- Adsorption is monolayer.
 - Adsorption increases with increase in temperature.
 - Enthalpy of adsorption is greater than 100 kJ mol^{-1}
 - Energy of activation is low.
34. In petrochemical industry alcohols are directly converted to gasoline by passing over heated
- Platinum
 - ZSM-5
 - Iron
 - Nickel
35. Match the columns
- | Column-I | Column-II |
|--|--------------------------|
| A. As_2S_3 sol | I. Bredig's Arc method |
| B. $\text{Fe}(\text{OH})_3$ sol | II. Double decomposition |
| C. Colloidal sols of metals like Au, Ag, Pt, etc. | III. Peptization |
| D. Conversion of freshly prepared precipitate into a colloidal sol | IV. Hydrolysis |
- A – II; B – IV; C – III; D – I
 - A – II; B – I; C – IV; D – III
 - A – IV; B – II; C – I; D – III
 - A – II; B – IV; C – I; D – III
36. In Langmuir's model of adsorption of a gas on a solid surface
- the mass of gas striking a given area of surface is proportional to the pressure of the gas
 - the mass of gas striking a given area of surface is independent of the pressure of the gas
 - the rate of dissociation of adsorbed molecules from the surface does not depend on the surface covered
 - the adsorption at a single site on the surface may involve multiple molecules at the same time
37. Which of the following electrolytes is least effective in coagulating ferric hydroxide solution?
- KBr
 - K_2SO_4
 - K_2CrO_4
 - $\text{K}_4[\text{Fe}(\text{CN})_6]$
38. is a silver sol used as an eye lotion.
- Amytol
 - Argyrol
 - Ciprofloxacin
 - Cylof
39. Which of the following is not emulsifying agent for W/O emulsion?
- Lampblack
 - Long chain alcohol
 - Proteins
 - Heavy metal salts of fatty acids
40. Among the following, the surfactant that will form micelles in aqueous solution at the lowest molar concentration at ambient condition is :-
- $\text{CH}_3(\text{CH}_2)_{15}\text{N}^+(\text{CH}_3)_3\text{Br}^-$
 - $\text{CH}_3(\text{CH}_2)_{11}\text{OSO}_3^-\text{Na}^+$
 - $\text{CH}_3(\text{CH}_2)_6\text{COO}^-\text{Na}^+$
 - $\text{CH}_3(\text{CH}_2)_{11}\text{N}^+(\text{CH}_3)_3\text{Br}^-$
41. At low pressure, the fraction of the surface covered follows
- second-order reaction
 - first-order reaction
 - fractional order
 - fractional order
42. The following statements relate to the adsorption of gases on a solid surface. Identify the incorrect statement among them:
- Energy of adsorption is negative
 - On adsorption, the residual forces on the surface are increased
 - Entropy of adsorption is negative
 - Peptization involves
43. involves
- precipitation of colloidal particles
 - disintegration of colloidal aggregates
 - evaporation of dispersion medium
 - impact of molecules of the dispersion medium on the colloidal particles
44. The isoelectric-point of a colloidally dispersed material is the pH value at which
- the dispersed phase migrate in an electric field
 - the dispersed phase does not migrate in an electric field
 - the dispersed phase has pH equal to 7
 - the dispersed phase has pH equal to zero
45. When solution of 5g of iodine in CS_2 was shaken with the same volume of water. The amount of iodine in $\text{C}_{12}\text{H}_{22}\text{O}_6 = 420.0$
- 1.19
 - 0.0019
 - 0.0119
 - 0.119

RESPONSE
GRID

- | | | | | |
|---------------------|---------------------|---------------------|---------------------|---------------------|
| 33. (a) (b) (c) (d) | 34. (a) (b) (c) (d) | 35. (a) (b) (c) (d) | 36. (a) (b) (c) (d) | 37. (a) (b) (c) (d) |
| 38. (a) (b) (c) (d) | 39. (a) (b) (c) (d) | 40. (a) (b) (c) (d) | 41. (a) (b) (c) (d) | 42. (a) (b) (c) (d) |
| 43. (a) (b) (c) (d) | 44. (a) (b) (c) (d) | 45. (a) (b) (c) (d) | | |

Space for Rough Work