EXERCISE-I (Conceptual Questions) **Build Up Your Understanding**

ADSORPTION

1. Physical adsorption· is appreciable at :-
(1) Higher temperature (2) Lower temperature
(3) At room temperature (4) 100°C temperature

2. The rate of physical adsorption:-
(1) Decreases with increase of pressure
(2) Is independent at high pressure
(3) Is maximum at one atmospheric pressure
(4) Always increases with increase of pressure

3. Which of the following is not a characteristic of chemi-sorption :-
(1) Adsorption is irreversible
(2) ΔH is of the order of 40 kJ
(3) Adsorption is specific
(4) Adsorption increases with increase of surface area

4. Which one of the following is not a correct statement?
(1) Physical adsorption is reversible in nature
(2) Physical adsorption involves vander waals forces
(3) Rate of physical adsorption increases with increase of pressure on the adsorbate
(4) High activation energy is involved for physical adsorption

5. The amount of gas adsorbed on charcoal increases
(1) Temperature & pressure
(2) Temperature & decreases with pressure on:
(3) Pressure & decreases with temperature
(4) None

6. Pd can adsorb 900 times its volume of hydrogen. This is called :-
(1) Absorption (2) Adsorption
(3) Occlusion (4) 2 & 3 both

7. Which is correct:-
(1) Langmuir adsorption is highly specific (2) Vander-Waal's adsorption is reversible
(3)Both 1 & 2 are exothermic (4) All are correct

8. Adsorption is accompanied by :-
(1) Decrease in entropy of the system (2) Decrease in enthalpy of the system
(3) $T\Delta S$ for the process is negative (4) All

9. Which characteristic of adsorption is wrong :-
(1) Physical adsorption in general decreases with temperature
(2) Physical adsorption in general increases with
(3) Physical Adsorption is a reversible process
(4) Adsorption is limited to the surface only

10. Graph between $\log\left(\frac{x}{m}\right)$ and log p is a straight line at an angle 45° with intercept on y-axis 0.3010. Calculate the amount of gas adsorbed in gram per gram of the adsorbent when pressure is 0.2 atm.
(1) 0.4 (2) 0.6 (3) 0.8 (4) 0.2

11. Sorption is the term used when :
(1) Adsorption takes place (2) Absorption takes place
(3) Both takes place (4) Desorption takes place

12. The volume of gases H_2, CH_4, CO_2 and NH_3 adsorbed by 1 g ofcharcoal at 288K are in the order :
(1) $H_2 > CH_4 > CO_2 > NH_3$ (2) $CH_4 > CO_2 > NH_3 > H_2$
(3) $CO_2 > NH_3 > H_2 > CH_4$ (4) $NH_3 > CO_2 > CH_4 > H_2$

13. The extent of adsorption of a gas on a solid depends on :
(1) The nature of gas (2) Pressure of gas
(3) Temperature of the system (4) All

14. Which forms multi molecular layers during adsorption :
(1) Physical adsorption (2) vander Waal's adsorption
(3) Freundlich adsorption (4) All

COLLOIDAL SOLUTION

15. The number of phases present in colloidal solution is :-
(1) 2 (2) 4 (3) 3 (4) 1

16. Butter is a colloid formed when :-
(1) Fat is dispersed in fat (2) Fat is dispersed in water
(3) Water is dispersed in fat (4) Suspension of casein in water

17. Lyophobic colloids are :-
(1) Reversible (2) Irreversible (3) Water loving (4) Solvent loving

18. When freshly precipitated $Fe(OH)_3$ is boiled with water in the presence of few drops of dilute HCl, a hydrated ferric hydroxide sol is obtained. This method is termed as :-
(1) Dialysis (2) Peptization (3) Ultrafiltration (4) Electrodispersion

19. Greater the valency, the higher is the coagulating power of ion. This rule was introduced by :-
(1) Hardy-Schulze (2) Graham (3) Kossel & Lewis (4) Faraday

20. The capacity of an ion to coagulate a colloidal solution depends on :-
(1) Its shape
(2) The amount of its charge
(3) The sign of the charge

(4) Both, the amount and the sign of the charge

21. All colloidal solutions show :-
(1) Very high osmotic pressure (2) High osmotic pressure
(3) Low osmotic pressure (4) No osmotic pressure

22. The charge of As_2S_3 sol is due to the absorbed :-
(1) H^+ (2) OH^- (3) O^{2-} (4) S^{2-}

23. Brownian motion shown by colloidal particles is its ---------- property :-
(1) Optical (2) Electrical (3) Kinetic (4) Chemical

24. A freshly prepared $Fe(OH)_3$ precipitate is peptized by adding $FeCl_3$ solution. The charge on the colloidal particles is due to preferential adsorption of:-
(1) Cl^- ions (2) Fe^{+++} ions (3) OH^- ions (4) None

25. In both dialysis and osmosis which particle do not pass through SPM :
(1) Water (2) Small molecules (3) Colloids (4) All

26. The correct statement in case of milk :-
(1) Milk is an emulsion of fat in water
(2) Milk in an emulsion of protein in water
(3) Milk is unstabilized by protein
(4) Milk is unstabilized by fat

27. A colloidal system involves :-
(1) A state of dissolution (2) A state of dispersion
(3) A state of suspension (4) None

28. In electrophoresis:-
(1) Sol particles move towards opposite electrodes
(2) Medium moves towards opposite electrodes
(3) Neither (1) nor (2)
(4) Both (1) & (2)

29. Detergent action of synthetic detergents is due to:-
(1) Interfacial area (2) High molecular weight
(3) Ionisation (4) Emulsifying properties

30. Which is not shown by sols:-
(1) Adsorption (2) Tyndall effect
(3) Flocculation (4) Paramagnetism

31. Which of the following is an emulsifier ?
(1) Soap (2) Water (3) Oil (4) NaCl

32. Emulsifiers are generally :-
(1) Soaps (2) Synthetic detergents
(3) Lyophilic sols (4) All of the above

33. Which of the following is most effective in causing the coagulation of ferric hydroxide sol :-
(1) KCl (2) KNO_3 (3) K_2SO_4 (4) $K_3[Fe(CN)_6]$

34. The colloidal sol of $SnCl_4$ prefers to adsorb ____in excess of HCl :
(1) Sn^{+4} (2) K^+ (3) H^+ (4) Cl^-

35. On adding $AgNO_3$ solution into KI solution, a negatively charged colloidal sol is obtained when they are mixed as :
(1) 100 mL of 0.1 M$AgNO_3$ + 100 mL of 0.1 M KI
(2) 100 mL of 0.1 M$AgNO_3$ + 50 mL of 0.2 M KI
(3) 200 mL of 0.1 M$AgNO_3$ + 200 mL of 0.1 MKI
(4) 100 mL of 0.1 M$AgNO_3$ + 100 mL of 0.15 MKI

36. Micelles are :
(1) Ideal solution (2) Associated colloids
(3) Adsorbed surfaces (4) Adsorbent solutes

37. Micelles have :
(1) higher colligative properties as compared to common colloidal sols
(2) lower colligative properties
(3) same colligative properties
(4) All of the above

38. Which of the following sol is formed due to following reaction :- SnO_2 + HCl (Excess) :-
(1) [$SnCl_4$] Cl^- (2) [$SnCl_4$]O^{-2}
(3) [$SnCl_4$]H^+ (4) None

39. Which of following ion has minimum flocculation value:
(1) Cl^- (2) SO_4^{2-} (3) PO_4^{3-} (4) $[Fe(CN)_6]^{4-}$

40. A negatively charged suspension of clay in water needs for precipitation the minimum amount of:
(1) Aluminium chloride (2) Potassium sulphate
(3) Sodium hydroxide (4) Hydrochloric acid

41. Which is not a colloidal solution :
(1) Smoke (2) Ink (3) Air (4) Blood

42. Which one is natural colloid :
(1) NaCl (2) Blood (3) RCOONa (4) Sugar

43. Medicines are more effective if they are used in :
(1) Colloidal state (2) Solid state
(3) Granular state (4) All of the above

44. Egg albumin is :
(1) Reversible colloid (2) Lyophilic colloid
(3) Protective colloid (4) All

45. Gelatin protects:-
(1) Gold sol (2) As_2S_3 sol (3) $Fe(OH)_3$sol (4) All

46. The coagulating power of an effective ion carrying the charge opposite to the particles has been illustrated by :-
(1) Brownian movement (2) Gold number
(3) Tyndall effect (4) Hardy-schulze rule

47. Hardy-Suhulze rule states that :-
(1) Non-electrolytes have better coagulating action on colloids than electrolytes
(2) Sols are coagulated by effective ions whose charge is opposite to that of sol and the ions of higher charge are much more effective than the ions of lower charge
(3) Charge of the ions has no effect on the coagulation of a sol
(4) Sols are coagulated only by those ions whose charges is similar to that of the sol

48. An example of micelle is :-
(1) As_2O_3 sol
(2) Ruby glass
(3) Na_2CO_3 solution
(4) Sodium stearate concentrated solution

49. To coagulate gelatin sol, which of the following is most effective :-
(1) NaCl (2) Na_3PO_4 (3) $AlCl_3$ (4) Alcohol

50. Which of the following has minimum flocculation value:-
(1) Pb^{2+} (2) Pb^{4+} (3) Sr^{2+} (4) Na^{+}

51. The gold numbers of A, B, C & Dare 0.04, 0.002, 10 and 25 respectively. The protective powers of A, B, C and Dare in the order:-
(1) A > B > C > D (2) B > A > C > D
(3) D > C > B > A (4) C > A > B > D

52. On addition of one mL solution of 10% NaCl to10 mL gold sol in presence of 0.025 g of starch, the coagulation is just prevented. The gold number of starch is :-
(1) 25 (2) 2.5 (3) 0.25 (4) 0.025

53. Gold number is a measure of :
(1) The amount of gold present in the colloidal solution
(2) The amount of gold required to break the colloid.
(3) The amount of gold required to protect the colloid.
(4) None of the above

54. Following are various types of colloids. Match column X with column Y.

X (Colloids)		Y (Classification)	
I	Rain cloud	A	Sol
II	Gelatin	B	Aerosol
III	Soap lather	C	Gel
IV	Boot polish	D	Foam

Correct matching is :

	I	II	III	IV
(1)	A	B	C	D
(2)	A	C	B	D
(3)	B	A	D	C
(4)	B	A	C	D

55. Silt in water is :
(1) Gel (2) Sol (3) Aerosol (4) Foam

56. Opal (mineral with liquid inclusions) is a:
(1) Gel (liquid dispersed in solid phase) (2) Solid sol (solid dispersed in solid phase)
(3) Sol (solid dispersed in liquid) (4) Foam (gas dispersed in liquid)

57. Some of the following are true solutions :
I : Air II : Sea water III : Glucose solution
IV : Gem stone V: Pearl VI: Blood
Select true solutions :
(1) I, II, III (2) II, III, IV, V (3) I, IV, V, VI (4) II, IV, VI

58. In multimolecular colloidal sols, atoms or molecules are held. together by :
(1) H-bonding (2) vander-Waals forces
(3) Ionic bonding (4) Polar covalent bonding

59. Tyndall effect is not observed in:
(1) Suspension (2) Starch sol
(3) Gold sol (4) NaCl solution

60. Which is kinetic phenomenon?
(1) Brownian motion (2) Tyndall effect
(3) Both (1) and (2) (4) None of these

61. Which pair is correctly matched?
(1) $[Fe(OH)_3]$ Fe^{3+} : Cl^-
(2) $[As_2S_3]$: As^{3+}
(3) $[SnO_2]$: SnO_3^{2-} in acidic medium
(4) [AgI] : I^- in excess of $AgNO_3$

62. Gold number of hemoglobin is 0.03. Hence, 100 mL of gold sol will require hemoglobin so that gold is not coagulated by 10 mL of 10% NaCl solution.
(1) 0.03 mg (2) 30 mg (3) 0.30mg (4) 3 mg

63. Which is not a correct matching of emulsions:

(1) Milk : O/W
(2) Cold cream : W /O
(3) Butter: O/W
(4) Vanishing cream: O/W

CATALYST

64. Which of the following statement is correct:-
(1) Catalyst accelerates the rate of a chemical reaction
(2) A catalyst can retard the rate of a chemical reaction
(3) A catalyst can control the speed of a reaction
(4) A catalyst does not alters the speed of a reaction

65. Which one of the following is not the example of homogeneous catalysis :-
(1) Formation of SO_3 in the chamber process
(2) Formation of SO_3 in the contact process
(3) Hydrolysis of an ester in presence of acid
(4) Decomposition of $KClO_3$ in presence of MnO_2

66. The decomposition of hydrogen peroxide can be slowed down by the addition of a small amount of acetanilide. The later act as :-
(1) Inhibitor
(2) Promoter
(3) Moderator
(4) Poison

67. Efficiency of the catalyst depends on its :
(1) Molecular weight
(2) Number of free valencies
(3) Physical state
(4) Amount of reactant used

68. Which of the following types of metals make the most efficient catalysts :-
(1) Transition metals
(2) Alkali metals
(3) Alkaline earth metals
(4) Radioactive metals

69. In the reaction
$KMnO_4 + H_2SO_4 + H_2C2O_4 \rightarrow$ products
Mn^{++} ions act as:-
(1) Positive catalyst
(2) Negative catalyst
(3) Auto catalyst
(4) Enzyme catalyst

70. In the Haber's process of synthesis of NH_3 :-
(1) Mo acts as a catalyst and Fe as a promoter
(2) Fe acts as a catalyst and Mo as a promoter
(3) Fe acts as inhibitor and Mo as a catalyst
(4) Fe acts as promoter and Mo as auto-catalyst

71. Which of the following statement is incorrect :
(1) Enzymes exist in colloidal state
(2) Enzymes are catalysts
(3) Enzymes can catalyse any reaction
(4) Urease is an enzyme

72. Platinized asbestos is used as a catalyst in the manufacture of H_2SO_4. It is an example of :-
(1) Homogeneous catalyst (2) Heterogeneous catalyst
(3) Auto-catalyst (4) Induced catalyst

73. In the Ostwald's process for the manufacturing of HNO_3, the catalyst used is:-
(1) Fe (2) Pt (3) V_2O_5 (4) Mo

74. In a reversible reaction a catalyst :-
(1) Increases the rate of forward reaction only
(2) Increases the rate of forward reaction to a greater extent than that of the backward reaction
(3) Increases the rate of forward reaction and decreases that of the backward reaction
(4) Increases the rate of forward and backward reaction equally

75. Which is false for catalyst :-
(1) A catalyst can initiate a reaction
(2) It does not alter the position of equilibrium in a reversible reaction
(3) A catalyst remains unchanged in quantity and composition at the end of reaction
(4) Catalysts are sometimes very specific in respect of a reaction

76. Which acts as a catalyst in the hydrogenation of vegetable oils :-
(1) Cu (2) Mo (3) Fe (4) Pt

77. Air can oxidize sodium sulphite in aq. solution but cannot do so in the case of sodium arsenite. If however, air is passed through a solution containing both sodium sulphite & sodium arsenite then both are oxidized. This is an example of:-
(1) Positive catalysis (2) Negative catalysis
(3) Induced catalysis (4) Auto catalysis

78. Zeolites are :-
(1) Water softner (2) Catalyst
(3) Cation exchanger (4) All of these

79. Zeolites:-
(1) Are microporous aluminosilicates
(2) Have general formula $M_{x/n}[(AlO_2)_x(SiO_2)_y]m\,H_2O$
(3) Have pore sizes between 260 pm to 7 40 pm
(4) All

80. Zeolites are used as catalyst in :
(1) Petrochemical industries during cracking
(2) In the preparation of H_2SO_4
(3) In the hydrolysis of ester
(4) All

81. Which is not the correct statement for a catalyst :
(1) It does not alter activation energy.
(2) It provides an alternate mechanism with a lower energy of activation

(3) Catalyst may form intermediates with the reactants
(4) Action of enzyme catalyst is always specific

82. Shape selective catalysts are so called because of :
(1) The shape of the catalysts
(2) The specificity of the catalysts .
(3) The size of the pores of the catalysts which can trap only selective molecules
(4) Their use for only some selected reactions

ANSWER KEY

EXERCISE-I (Conceptual Questions)

1.	(2)	**2.**	(2)	**3.**	(2)	**4.**	(4)	**5.**	(3)	**6.**	(4)	**7.**	(4)
8.	(4)	**9.**	(2)	**10.**	(1)	**11.**	(3)	**12.**	(4)	**13.**	(4)	**14.**	(4)
15.	(1)	**16.**	(3)	**17.**	(2)	**18.**	(2)	**19.**	(1)	**20.**	(4)	**21.**	(3)
22.	(4)	**23.**	(3)	**24.**	(2)	**25.**	(3)	**26.**	(1)	**27.**	(2)	**28.**	(1)
29.	(4)	**30.**	(4)	**31.**	(1)	**32.**	(4)	**33.**	(4)	**34.**	(4)	**35.**	(4)
36.	(2)	**37.**	(2)	**38.**	(1)	**39.**	(4)	**40.**	(1)	**41.**	(3)	**42.**	(2)
43.	(1)	**44.**	(4)	**45.**	(4)	**46.**	(4)	**47.**	(2)	**48.**	(4)	**49.**	(4)
50.	(2)	**51.**	(2)	**52.**	(1)	**53.**	(4)	**54.**	(3)	**55.**	(2)	**56.**	(1)
57.	(1)	**58.**	(2)	**59.**	(4)	**60.**	(1)	**61.**	(1)	**62.**	(3)	**63.**	(3)
64.	(1)	**65.**	(2)	**66.**	(1)	**67.**	(2)	**68.**	(1)	**69.**	(3)	**70.**	(2)
71.	(3)	**72.**	(2)	**73.**	(2)	**74.**	(4)	**75.**	(1)	**76.**	(4)	**77.**	(3)
78.	(4)	**79.**	(4)	**80.**	(1)	**81.**	(1)	**82.**	(3)				