CHEMISTRY

BOOKS - V PUBLICATION

SURFACE CHEMISTRY

Question Bank

1. Write any two characteristics of chemisorption

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2. Why does physisorption decrease with the increase of temperature

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3. Why are powdered substances more effective adsorbents than their crystalline forms?

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4. Whty is it necessary to remove CO when ammonia is obtained by Haber process ?

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5. Why is the ester hydrolysis slow at the beginning and becomes faster after some time?

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6. What is the role of desorption in the process of catalysis?

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7. What modification can you suggest for Hardy-Schulze law?

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8. Why is it essential to wash the precipitate with water before estimating it quantitaively?

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9. Distinguish between the meaning of the terms adsorption and absorption.Give one example of each

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10. What is the difference between physisorption and chemisorption?

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11. Give reason why a finely divided substance is more effective as an adsorbent?

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12. What are the factors which influence the adsorption of a gas on a solid?

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13. Freundlich adsorption isotherm is $\frac{x}{m} = kp^{\frac{1}{n}}$ where $n > 1$. Anser the following questions based on Freundlich adsorption isotherm: What is adsorption isotherm?

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14. What do you understand by activation of adsorbent & How is it achieved?

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15. What role does adsorption play in heterogeneous catalysis?

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16. Why is adsorption always exothermic?

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17. How are the colloidal solutions classified on the basis of physical states of dispersion medium and dispersed phase?

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18. Discuss the effect of pressure and temperature on the adsorption of gasses and soilds.

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19. What are lyophilic and lyophobic sols? Give one example of each type, why are hydropbic sols easily coagulated?

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20. What are the difference between multiimolecular and macromolecular colloids? Give one example of each.How are associated

colloids different from these two types of colloids.

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21. what are enzymes? Write in brief the mechanism of enzyme catalysis.

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22. How are colloids classified on the basis of i.Physical states of components ii.nature of

dispersion medium and iii.interaction between dispersed phase and dispersion medium.

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23. Explain what obsserved i.when a beam of light is passed through a colloidal sol. ii.an electrolyte,NaCl is added to hydrated ferri oxide sol. iii.electic current is passed through a colloidal sol.

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24. What are emulsions? What are their different types? Give example of each type.

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25. What is demusification ? Name two demulsifiers.

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26. Action of soap is due to emulsification and micelle formation. Comment.

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27. Give four examples of heterogeneous catalysis.

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28. What do you mean by activity and selectivity of catalysts?

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29. Descibe some features of catalysis by zeolites.

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30. What is shape selective catalysis?

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31. Explain the following terms: i.Electrophoresis ii.Coagulation iii.Dialysis iv.Tyndall effect

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32. Give four uses of emulsions.

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33. What are associated colloids or micelles?

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34. Explain the terms with the suitable examples: i. Alcosol ii. Aerosol iii.Hydrosol

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35. Comment on the statement that "colloid is not a substance but a state of substance".

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36. Categorises following cases of adsorption in to physisorption and chemisorption. a. Adsorption of NH_3 by charcoal. b. Adsorption of H_2 on Pt. c. Adsorption of CO by Ni.

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37. "Adsorption is a surface phnomenon" comment on this statement

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38. When adsorption isobar is drawn for a paricular case, it was fount that,x/m initially increase with temperature,reaches maximum and then decreases gradually .a. Can you explain these observation? B.to which type of adsorption does this belong.

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39. In most of the catalytic processes powdered or spongy metals are used a s catalysts. For example in Haber process, spongy iron is used while in reduction of alkenes finely divided nickel is used as catalyst, Substantiate why?

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40. Catalysis plays an important role in controlling automobile pollution. Justify.

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41. Cite an example to show that enzymes are highly specific.

A.

B.

C.

D.

Answer:

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42. When sunlight enters into a dark room through a slit, what will you observe? Name the phenomenon.

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43. Following properties are associated with lyophilic and lyophobic colloids.Classify them seperately, a. There is reversilbllity in colloids. b. These are basically unstable. C.These are coagullated by addding electoloyte. d.

Viscosity and surface tension of the sols are much higher than those of dispersion medium.

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44. Some of the important applications of colloids are given below. Identify and justify the properties, of colloids responsible for the applications. i.Purification of water

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45. As_2S_3 sol particles are negatively charged. The. sol can be precipitated by adding $BaCl_2$, solution. a How do you account for thè process? b. $AICl_3$, is more efficient than $BaCl_2$, in coagulating tbe sol. Justify. c. Throwing of electrical sand particles on clouds causè artificial rain. How will you describe this?

A.

B.

C.

D.

Answer:

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46. A graph showing the adsorption isotherm according to Freundlich isotherm is given. a. How are the extent of adsorption and pressure related? b. Draw a plot of 'log x / m' to 'log P' and explain how you obtain the value of 'k' and '1 / n'

'(##VPU_HSS_CHE_XII_C05_E03_011_Q01##)'

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47. Which will be adsorbed more readily on the surface of charcoal.and why - NH '_3' or 'CO_2 ?'

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48. 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 'H_2 O_ iii. Soap mixed with water above cmc

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49. In chemisorption why adsorption Ist ,increases and then decreases?

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50. What happens when a freshiy prepared 'Fe(OH)_3' is shaken with a Iitte amount of dilute sotution' of FeCl3?

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51. Which of the following electrolytes is most effective for the coagulation of $Fe(OH)_3$ sol and why? $NaCl, Na_2SO_4, Na_3PO_4$

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52. Why artificial rain can be caused by throwing 'common salt on the clouds?

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53. Gelatin is generally added to ice creams. Why?

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54. What happen's when (a) a beam of light is passed through As_2S_3 sol (b) KCl is added to $Fe(OH)_3$ sol?

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55. Write the expression of Freundlich isotherm?

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56. "Milk is a colloidal solution" a.write its dispersed phase and dispersion medium. B.Write another example for this type of colloid.

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57. Colloids can be converted into precipitate on the addition of electrolytes. a. Name the above phenomenon B. What do you mean by gold number and coagulation value?

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58. Name the type of preparation in which the following examples are involved.

a) $As_2O_3 + 3H_2S \rightarrow As_2S_3 + 3H_2O$

b) $SO_2 + 2H_2S \rightarrow 2S + 2H_2O$

c) $FeCl_3 + 3H_2O \rightarrow Fe(OH)_3 + 3HCl$

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59. Why 'SnO2' forms a positively charged sol in solutions with 'pH<7' and negatively charged sol in solutions with pH>7'

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60. Physical adsorption is multimolecular while chemisorption is unimolecular. Why?

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61. A colloidal sofution of 'AgI' is prepared by two different methods shown below:

i. What is the charge on 'AgI' colloidal particles in the tubes (A) and (B).

ii. What is the reason for the origin of charge.

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62. Addition of H_2 to acetylene gives ethane in présence of palladium but if $BaSO_4$ and

quinoline or sulphur are also added, the product is ethene. Why?

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63. Explain the scientific reason behind the phenomena

given below.

The rising and setting sun appears red.

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64. Adsorption of a gas on the surface of solid is generally accompanied by decrease in entropy. Still it is a spontaneous process. Explain.

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65. In an adsorption experiment, a graph between $\log\left(\frac{x}{m}\right)$ versus $\log P$ was found to be linear with a slope 45°. The intercept on the log $\left(\frac{x}{m}\right)$ axis was found to be 0.3010 .'

Calculate thei amount of the gas adsorbed per gram of charcoal undér a pressure of 0.5 atm.

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66. Lyophilic colloịds are also called reversible sols. Why?

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67. Alum is used for cleaning muddy water. Give the reason?

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68. Smoke is passed through charged plates before it is allowed to come out of chimney's in factories. Why?

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69. Name two industrial processes in which heterogeneous catalysts are employed?

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70. Classify the fóllowing as multimolectilar, macromolecular and associated colloids starch sol, sulphur sol, gold sol, rubher sol, protein sol, soap solution.

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71. Can you purity a sol by filtering it through an ordinary fiter paper?

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72. Peptization is the reverse of precipitation comment on the statement.

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73. Explain what obsserved i.when a beam of light is passed through a colloidal sol. ii.an electrolyte,NaCl is added to hydrated ferri oxide sol. iii.electic current is passed through a colloidal sol.

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74. Justify the use of gelatin as a protective colloid.

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75. Explain the term (a) Flocculation value (b) Gold number

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76. What is the basis of artificial rain?

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77. The nature of bonding forces in adsorption are

A. purely physical such as vander waals' forces

B. purely chemical

C. both chemical and physical

D. sometimes physical and sometimes chemical

Answer: C

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78. Which is not applicable to chemisorption? Its heat of adsorption is high, It takes place at high temperature, It is reversible, It forms monomolecular layers

A. Its heat of absorption is high

B. It takes place at high temperature

C. It is reversible

D. It forms monomolecular layers

Answer: C

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79. An emulsion is a colloidal system of : 2 solids, 2 liquids, one gas and one solid, one gas and one liquid

A. 2 solids

B. 2 liquids

C. one gas and one solid

D. one gas and one liquid

Answer: B

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80. In the colloidal state the particle size ranges below 1mm, between 1 nm to 100nm, more than 100nm, none of the above

A. below 1mm

B. between 1 nm to 100nm

C. more than 100nm

D. none of the above

Answer: B

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81. Which of the following is lyophobic colloid?

(1)Gelatine (2)Sulphur (3)Starch (4)Gumarabic

A. Geletin

B. Sulphur

C. Starch

D. Gumarabic

Answer: B

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82. Physical adsorption is essentially quite appreciable: at room temperature, at higher

temperature, at lower temperature, none of these

A. at room temperature

B. at higher temperature

C. at lower temperature

D. none of these

Answer: C

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83. Fog is an example of colloidal system of : liquid dispersed in gas, gas dispersed in gas, solid dispersed in gas, solid dispersed in liquid

A. liquid dispersed in gas

B. gas dispersed in gas

C. solid dispersed in gas

D. solid dispersed in liquid

Answer: A

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84. Smoke is colloidal solution of (1)Solid dispersed in liquid (2)Gas dispersed in solid (3)Solid dispersed in gas (4)Gas dispersed in liquid

A. Solid dispersed in liquid

B. gas dispersed in solid

C. solid dispersed in gas

D. gas dispersed in liquid

Answer: C

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85. Which of the following is a hydrophilic colloidal sol? (1)Barium sulphate solution (2)Arsenius sulphide solution (3)Starch sol (4)Silver iodide sol

A. Barium sulphate solution

B. Arsenius sulphide solution

C. Starch sol

D. Silver iodide sol

Answer: C

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86. Alums purify muddy water by (1)Dialysis (2)Adsorption (3)Coagulation (4)Forming true solution.

A. Dialysis

B. Adsorption

C. Congulation

D. Forming true solation

Answer: C

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87. The function of gum arabic in the preparation of Indian ink is (1)Coagulation (2)Peptization (3)Protective action (4)Adsorption

A. Coagulation

B. Peptization

C. Protective action

D. Adsorption

Answer: C

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88. Gelatin is generally added to ice creams. Why?

A. prevent formation of the colloidal sol

B. enrich the fragrance

C. prevent crystallisation and stabilise the mix

D. modify the taste

Answer: C

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89. Which of the following characteristics is not correct for physical adsorption? (1)Adsorption increases with increase in temperature (2)Adsorption is spontaneous

(3)Both enthalpy and entropy of adsorption are negative (4)Adsorption on solids is reversible

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

Answer: A

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90. Adsorption of a gas on the surface of solid is generally accompanied by decrease in entropy. Still it is a spontaneous process. Explain.

A. enthalpy is positive

B. entropy decreases

C. entropy increases

D. free energy increases

Answer: B

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91. Ferric chloride is applied to stop bleeding due to a cut because:

A. Fe^3+ ' ion congulates blood which is a negatively charged sol-

B. Fe '^3+' ion còagulates blood which is, a positively in charged sol

C. Cl- ion coagulates bload which is a positively charged sol

D. Cl' - jon cóagulates blood which is ą negatively charged sol

Answer: A

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92. Cellulose is dispersed in ethanol is called

A. emulsion

B. micelle

C. collodion

D. hydrophilic sol

Answer: C

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93. Blood may be purified by

A. Dialysis

B. electro-osmosis

C. coagulation

D. filteration

Answer: A

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94. Which one of the following has maximum value of flocculation power? Pb^{2+}, Pb^{+4}, Sr^{3+}, Na^{+}

A. Pb^2+

B. Pb^+4

C. fS r^f3+

D. Na^*

Answer: B

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95. The coagulating power of an electrolyte for arsenious súlphide sol decreases in the order :

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

$PO_4^{3-} > SO_4^{2-} > Cl^-$,

$Cl^- > SO_4^{2-} > Po_4^{3-}, Al^{3+} > Ba^{2+} > Na^+$

A. Na^+gtAl^3+gtB a^2+

B. PO_4^3rarrSO_4^2rarrCl^-

C. ClgtSO_4^2gtPo_4^t

D. Al^3+gtBa^2+gtNa^*

Answer: D

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96. Blue colour of water in sea is due to

A. reflection of blue light by impurities in sea water

B. scattering of blue light by water

C. refraction of blue sky by water

D. none of these

Answer: A

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97. Which of the following electrolyte will have maximum flocculation -value of $Fe(OH)_3$ sol?

$NaCl, Na_2SO_4, (NH_4)_3PO_4, K_2SO_4$

A. NaCl

B. Na_2 ~S^prime

C. (NH_4rarr)_3 PO_4

D. K_2 SO_4

Answer: A

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98. Milk is an example of

A. gel

B. emulsion

C. sol

D. suspension

Answer: B

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99. The colour of sky is due to

A. absorption of light by atmospheric gases

B. transmission of light

C. wavelength of.scattered light

D. all of these

Answer: C

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100. Colloidal silver is obtained by reduction of silver nitrate with : acetic acid, molecular hydrogen, glucose, fructose

A. acetic acid

B. molecular hydrogen

C. glucose

D. fructose

Answer: C

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101. Which of the following electrolytes will be most effective in the coagulation of gold sol?

A. $NaNO_3$

B. $K_4[Fe(CN)_6]$

C. Na_3PO_4

D. $MgCl_2$

Answer: D

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102. Surface tension of lyophilic sols is

A. lower than that H_2O

B. more than that of H_2O

C. equal to that of H_2O

D. none of the above

Answer: A

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103. Which of the following is correct about lyophilic sols/

A. They are irreversible

B. They are formed by inorganic substances

C. They are readily coagulated by addition of electrolytes

D. They are self stabilised

Answer: D

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104. Which one of the following is a slyophilic colloid?

A. milk

B. gum

C. fog

D. blood

Answer: B

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105. Movement of dispersion medium under the influence of electric fiels is

A. Electrodialysis

B. Electrophoresis

C. Electroosmosis

D. Cataphoresin

Answer: C

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106. A colloidal system in which gas bubbles are dispersed in a liquid is known as

A. foam

B. aerosol

C. sol

D. emulsion

Answer: A

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107. The Tyndall effect associated with colloidal particles is due to

A. presence of electrical charge

B. scattering of light

C. absorption of light

D. reflection of light

Answer: B

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108. Milk is an emulsion of fat dispersed in

A. water

B. amino acid

C. fatty acid

D. saline water

Answer: A

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109. Which of the following is an example of associated colloid

A. protien + water

B. Soap +water

C. Rubber + benzene

D. $As_2O_3+Fe(OH)_3$

Answer: B

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110. Tyndall effect would be observed in a

A. solution

B. solvent

C. precipitate

D. collodial sol

Answer: D

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111. Collodial paritcles in a soil can be coagulated by

A. heating

B. adding an electrolyte

C. adding oppositely charged sol

D. any of the above methods

Answer: D

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112. The electrical charge on a colloidal particle is indicated by

A. Brownian movement

B. electrophoresis

C. ultramicroscope

D. molecular sieves

Answer: B

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113. The protective power of a lyophilic sol is : Hardy - schulze rule, propotional to the quantity of electrical charge on it, measured in terms of gold number, determined by the size of its colloidal particles

A. Hardy - schulze rule

B. propotional to the quantity of electrical charge on it

C. measured in terms of gold number

D. determined by the size of its colloidal particles

Answer: A

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114. Identifiy the gas which is readily adsorbed by activated charcol? N_2, SO_2, H_2, O_2

A. N_2

B. SO_2

C. H_z

D. O_2

Answer:

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115. Small liquid droplets dispersed in another liquid is called

A. suspension

B. emulsion

C. gel

D. true solution

Answer: D

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116. A liquid is found to scatter a beam of light without leaving any residue when passed through the filter paper. The liquid can be described as

A. suspension

B. oil

C. a colloidal sol

D. a true solution

Answer: D

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117. The minimum concentration of an electolyte required to cause coagulation of sol is called

A. flocculation value

B. gold number

C. protective value

D. none of these

Answer: A

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118. All colloids

A. a re suspensions of one phase in another

B. are two phase systems

C. contain only water soluble particles

D. are true solution

Answer: B

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119. Peptisation is process of

A. precipitation of colloidal particles

B. purification of colloids

C. dispersing precipitate into colloidal sols

D. movement of colloidals particles in the electrical field

Answer: C

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120. Emulsifier is an agent which

A. accelerates the dispersion

B. homogenizes an emulsion

C. stabilizes an emulsion

D. aids the flolcculation of an emulsion

Answer: C

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121. The formation of micelles which occurs only beyond a certain temperature is called

A. critical temperature

B. critical sol temperature

C. consulate temperature

D. kraft temperature

Answer: D

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122. An aresnious sulphides sol carries a negative charge. The maximum precipitating

power of this sol is possessed by : K_2SO_4 $CaCl_2$ Na_3PO_4 $AlCl_3$

A. K_2 SO_4

B. CaCl_2

C. Na_3 PO_4

D. AlCl_3

Answer: D

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123. Which one of the following is correctly matched

A. emulsion - curd

B. foam - mist

C. aerosol - smoke

D. solid sol - cake

Answer: C

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124. Which of the following forms cationic micelles above certain concentration?

A. sodium dodecyl sulphate

B. sodium acetate

C. urea

D. cetyl trimethyl ammonium bromide

Answer: D

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125. In Langmuir's model of adsorption of a gas on a solid surface

A. The mass of gas striking a given area of surface is proportional to the pressure of the gas

B. the mass of gas striking a given area of surface is independof ent the pressure of the gas

C. the rate of dissociation of adsorbed molecules from the surface does not depend on the surface covered

D. the adsorption at a single site on the surface may involve multiple molecules a t the same time.

Answer: A

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126. Langmuir adsorption isotherm under high pressure is represented as

A. $x/m=a/b$

B. $x/m = a .p$

C. $x/m=1/ a . p$

D. $x/m =b/a$

Answer: A

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