CHEMISTRY

BOOKS - CENGAGE CHEMISTRY (HINGLISH)

SURFACE CHEMISTRY

Illustration

1. What is physical adsorption.

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2. What is sorption.

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

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4. How do size of particles of adsorbent, pressure of gas, and prenvailing temperature influence the extent of adsorption of a gas on a solid?

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5. Why physisorption is multi-molecular whereas chemisorption is unimolecular ?

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6. Compare the heat of adsorption for physical and chemical adsorption?

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7. In the case of chemisorption, why adsorption first increases and then decreases with temperature?

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8. Which will be adsorbed more readily on the surface of charcoal and why– NH_3 or CO_2?

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9. Give the expression of Freubndlich isotherms.

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10. What is meant by chemical adsorption?

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11. What is desorption?

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12. What is occlusion?

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13. Explain the following observations.

a. Sun looks red at the time of sunset.

b. Rate of physical adsorption decreases with rise in temperature.

c. Physical adsorption is monolayered.

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14. How is adsorption of a gas related to its critical temperature?

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15. Applications Of Adsorption

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16. In an experiment, $200mL$ of $0.5M$ oxalic acid is shaken with $10g$ of activated charcoal and filtered. The concentration of the filtrate is reduced to $0.4M$. The amount of adsorption (x/m) is

(a) 0.9 b. 1.8 c. 0.18 d. 0.09

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17. $2.0g$ of charcoal is placed in $100mL$ of $0.05MCH_3COOH$ to form an adsorbed mono-acidic layer of acetic acid molecules and thereby the molarity of CH_3COOH reduces to 0.49. The surface area of charcoal is $3 \times 10^2 m^2 g^{-1}$. The surface area of charcoal is adsorbed by each molecule of acetic acid is

A. $1.0 \times 10^{-18} m^2$

B. $1.0 \times 10^{-19} m^2$

C. $1.0 \times 10^{13} m^2$

D. $1.0 \times 10^{-22} m$

Answer: A

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18. Which of the following statements is not true?

a. Both physisorption and chemisorption are exothermic.

b. Physisorption occurs with increase of free energy.

c. Physisorption requires low activation energy but chemisorption requires high activation energy.

d. The magnitude of chemisorption increases and that of physisorption decreases with rise in temperature.

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19. Yhe rate of chemisorption

a. increaeses with decreases in temperature

b. increases with increasesin tempreture

c. increases with decreases in the pressure of gas

d. is independent of the pressure of gas

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20. Which of the two, He and Ne, gets adsorbed on the surface of charcoal more readily and why?

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21. Adsorption, if spontaneous, is exothermic. Explain.

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22. Why is it necessary to remove CO when ammonia is obtained by Haber's process?

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23. Why is ester hydrolysis slow in the beginning and becomes faster after some time?

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24. Activity And Selectivity Of Catalysts

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25. How does BF_3 act as a catalyst in industrial process?

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26. Shape Selective Catalysis By Zeolites

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27. Shape Selective Catalysis By Zeolites

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

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29. i. The ability of a catalyst to direct the reaciton to yield particular products is called

a. Reactivity b. Selectivity c. Activity d. Fugacity

ii. Which of the following Is an example of zeolite?

a. $ZSM-5$ b. $AgNO_3$ c. $Mg(OH)_2$ d. $Co(OH)_3$

(iii) Reactions in zeolite catalyst depends on

a. Pores b. Apertures

c. Size of cavities d. All of these

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30. Taking two examples of heterogeneously catalyzed reactions, explain how a heterogeneous catalyst helps in the reaction.

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31. Give four examples of heterogeneous catalytic reactions.

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32. How does the rate of an enzyme-catalyzed reactions vary with (a) temperature and (b) pH? Represent diagrammatically.

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33. Indicate a chemical reaction involving a hoogeneous catalyst.

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34. How does a catalyst work?

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35. Activity And Selectivity Of Catalysts

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36. A catalyst lowered the activation energy byh $25KJmol^{-1}$ at $25^{\circ}C$. By how many times will the rate grow?

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37. At $400K$, the energy of activation of a reaction is decreased by $0.8Kcal$ in the presence of catalyst. Hence, the rate will be

A. Increased by 2.73 times

B. Increased by 1.18 times

C. Decreased by 2.72 times

D. Increased by 6.26 times

Answer: A

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38. For the coagulation of $10mL$ of $Fe(OH)_3 sol, 2mL$ of $1MKBr$ is required. What is the flocculation value of KBr?

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39. On addition of $1mL$ solution of $10\,\%\,NaCl$ to $10ml$ gold sol in the presence of $0.0250g$ of starch, the coagulation is just prevented. What is the gold number of starch?

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40. What are miclells? How do they differ from ordianry cordinary colloidal particles? Give two examples of micelles-forming substances.

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41. State Hardy schulze rule.

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42. MULTIMOLECULAR COLLOIDS, MACROMOLECULAR AND ASSOCIATED COLLOIDS

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43. What is Kraft tempreature?

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44. What is meant by the term peptization?

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45. Which one 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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46. How is dialysis carried out? Mention its one application.

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47. For the coagulation of $100mL$ of arsenious sulphite sol, $5mL$ of $1MNaCl$ is required.

What is the flocculaton value of $NaCl$?

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48. The coagulation of $200mL$ of a positive colloid took place when $0.73gHCl$ was added to it without changing the volume much. The flocculation value of HCl for the colloid is

A. 36.5

B. 100

C. 200

D. 150

Answer: B

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49. What is observed when sodium chloride is added to a colloidal solution of ferric hydroxide?

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50. Give two examples of colloidal solution of liquid dispersed in solid. What is the name of the colloidal solution?

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51. The coagulation of $100mL$ of a colloidal solution of gold is completely prevented by the addition of $0.030g$ of it before adding $1mL$ of $10\,\%\,NaCl$ solution. Find out the gold number of starch?

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52. $50mL$ of standard gold solution needs $0.05mg$ of gelatin for its protection from coagulation. Calculate the gold number of gelatine?

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53. Explain the following observation:

a. Lyophilic colloid is more stable than lyophobic colloid.

b. Coagulation takes place when sodium chloride solution is added to a colloidal solution of ferric hydroxide.

c. Sky appears blue in colour.

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54. What is the difference between a colloidal solution, gel, and emulsion?

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55. What type of colloidal sols are formed in the following:

a. Sulphur vapours are passed through cooled water.

b. White of an egg is mixed with water.

c. Soap solution.

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56. A colloidal solution of ferric oxide is prepared by two different methods as shown

below.

a. What is the charge on colloindal particles in the two test tubes (A) and (B)?

b. Give reasons for the origin of charge.

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57. Explain the following observation:

a. A beam of light passing through a colloidal solution has a visible path.

Passing an electric currenet through a colloidal solution removes colloidal particles

from it.

c. Ferric hydroxide sol coagulates on addition of potassium sulphate.

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58. Compare the coagulation power of $AlCl_3$ with that of $NaCl$. Given that their coagulation values are 0.093 and 52 respectively?

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59. Compare the coagulating power of HCl with that of KBr . Given the coagulation values are 30.8 and 138 , respectively?

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60. What modification can you suggest in the Hardy Schulze law?

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61. Why is it essential to wash the precipitate with water before estimating it quantitatively?

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62. What is meant by critical micellization concentration?

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63. What type of substances from hyphobic sols?

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64. Difine emulsification?

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

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66. What is the significance of reciprocal of "gold number"?

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67. What is common in aqua sols and solid aerosol? How do they differ?

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68. What is colloidion?

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69. Define colloidal solution?

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70. A sol of Agl can be positively or negatively charged. Explain how and why?

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71. Give four uses of emulsion.

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72. Give an example of an associated colloid?

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73. Give one example of positively charged sol and one example of negatively charged sol.

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74. What is electrodialysis?

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75. What is the main cause of cahrge on a colloidal solution?

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76. Why do collidal solutions exhibit Tyndall effect?

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77. Difine ultrafiltration.

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78. Which is not the characteristic of hydrophobic sols?

A. They are highly susceptible to coagulation by addition of electrolytes

B. They have nearly the same surface tension and viscosity as that of dispersion medium

C. Their stability is due to both electric charge and salvation of the particles

D. Sol particles can be seen under ultra microscope

Answer: C

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79. Hydrophilic gels, when placed in water, absorb liquid resulting in an increases of their volume. This process of swelling of gels takes place with

A. No change in volume

B. Net increase in volume

C. Net decrease in volume

D. Large reduction in volume

Answer: C

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80. Under the influemce of an electric field, the particles in a sol migrate towards cathode. The coagulation of the same sol is studied using $NaCl, Na_2SO_4$, and Na_3PO_4 solutions. Their coagulation values will in the order

a. $NaCl > Na_2SO_4 > Na_3PO_4$

b. $Na_2SO_4 > Na_3PO_4 > NaCl$

c. $Na_3PO_4 > Na_2SO_4 > NaCl$

d. $Na_2SO_4 > NaCl > Na_3PO_4$

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81. During electro-osmosis of $Fe(OH)_3$ sol

a. Sol particles move towards anode

b. Sol particles move towards cathode

c. The dispersion medium move towards anode

d. The sol particles do not move in either direction

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82. Which of the following ionic substances will be most effective in precipitating the sulphur sol?

a. KCl

$BaCl_2$

c. $Fe_2(SO_4)_3$

d. Na_3PO_4

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83. The colligative property of a sol compared to the aqueous solution of glucose of same concentration will be

a. Much smaller

b. Much higher

c. The same

d. Slightly lower

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84. Electrolytes can cause coagulation as well as peptization of colloidal solution. Explain ?

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Solved Examples

1. Write two differences between multimolecular colloids and macromolecular colloids ?

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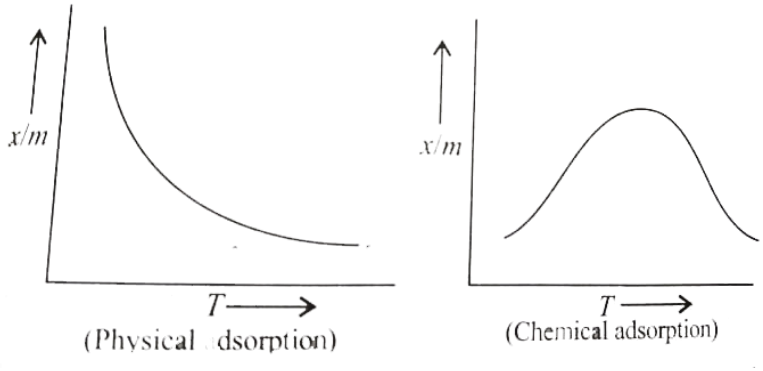
2. Physical and chemical adsorption respond differenlty with a rise in temperature. What is this difference and why is it so? lt brgt



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3. A small amount of silica gel and anhydrous calcium chloride are placed separately in two coeners of a vessel containng water vapour. What phenomena will occur?

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4. How is adsorption of a gas related to its critical temperature?

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5. Explain the following observation:

a. Lyphilic colloid is more stable than lyophobic colloid.

b. Coagulation takes place when sodium chloride solution is added to a colloidal solution of ferric hydroxide.

c. Sky appears blue in colour.

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6. Give one test to distinguish whether the given emulsion is oil-in-water-type emulsion.

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7. Consider the adsorption isotherm given below and interpret the variation in the extent of adsorption $\left(\frac{x}{m}\right)$ when

a. Temperature increased at constant pressure.

b. Pressure increases at constant temperature.

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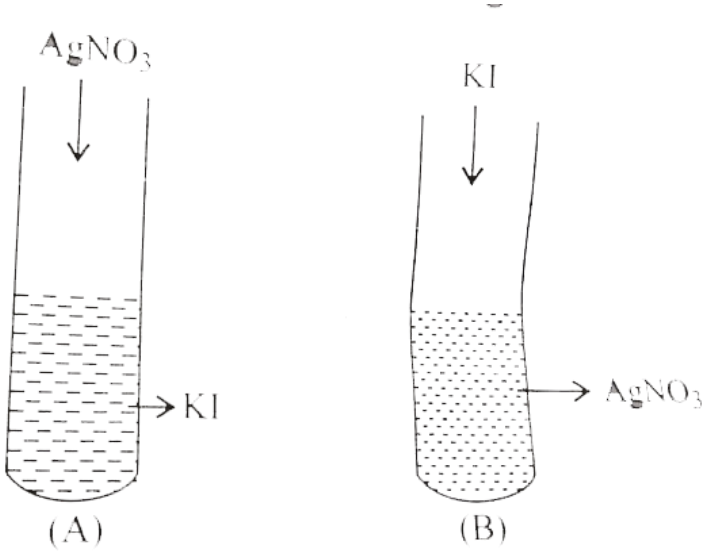
8. A colloidal solution of Agl is prepared by two different methods as shown in the figure below:



What is the charge of Agl colloidal particles in the two test tubes (A) and (B) ?

b. Given reasons for the origin of charge.

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9. Adsorption Theory Of Heterogeneous Catalysis

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10. Adsorption, if spontaneous, is exothermic. Explain.

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11. In a coagulation experiment, $5mL$ of As_2S_3 is mixed with distilled water and $0.1M$ solution of an electrolyte AB so that the total volume is $10mL$. It was found that all solutions sontianing more than $4.6mL$. Of AB coagulate within 5 min. What is the flocculation value of AB for As_2S_3 solution?

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12. In an adsorption experiment, a graph between $\log\left(\frac{x}{m}\right)$ versus $\log P$ was found to

be linear with a slope of 45° . The intercept on the log $\left(\frac{x}{m}\right)$ axis was found to be 0.3010 . Calculate the amount of the gas adsorbed per gram of charcoal under a pressure of 0.5 atm` .

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13. The volume of nitrogen gas Vm (at STP) required to cover a sample of silica gel with a monomolecular layer is $129cm^3g^{-1}$ of gel. Calculate the surface area per gram of the gel

if each nitrogen molecule occupies $16.23 \times 10^{-20} m^2$.

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14. $100mL$ of a colloidal solution is completely precipitated by addition of $5mL$ of $1M$ $NaCl$ solution. Calculate the coagulation value of $NaCl$.

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15. What is the charge on the colloidal particles in the following ?

a. $Fe(OH)_3$ sol

b. As_2S_3 sol

c. Colloidal sol of sillver

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16. which of the following is most effective in coagulating ferric hydroxide sol?

a. KCl

b. $FeCl_3$

c. Na_2SO_4

d. $K_3\left[Fe(CN)_6\right]$

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17. Write a mathematical expression showing relationship between the amount of solute adsorbed per unit mass of the solid adsorbent and the concentration of the solution in the solution.

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18. In the case of chemisorption, why adsorption first increases and then decreases with temperature?

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19. Why physisorption is multi-molecular whereas chemisorption is unimolecular ?

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

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Ex 5 1

1. Expalin the following terms

a. Adsorption

b. Adsorbate

c. Adsorbent

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2. Consider the adsorption isotherm given below and interpret the variation in the extent of adsorption $\left(\frac{x}{m}\right)$ when

a. Temperature increased at constant pressure.

b. Pressure increases at constant temperature.

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3. How is adsorption of a gas related to its critical temperature?

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4. Derive the following:

a. Langmuir iostherm

b. Freundlich iostherm

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5. Write differences between physisorption and chemisorption.

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6. Which of the two, adsorption or adsorption, is surface phenomenon?

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7. Why are powdered substances more effective adsorbent than their crystalline forms ?

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8. Discuss different types of adsorption and their properties.

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9. The effect of pressure on adsorption is high if

a. Temperature is low

b. Temperature is high

Temperature is neither very low nor very high

d. Charcoal piece is taken in place of charcoal powder

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10. Which one of the following statements is wrong?

a. Physical adsorption of gas directly related to its critical temperature.

b. Chemical adsorption decreases regularly as the temperature is increased.

c. Adsorption is an exothermic process.

d. A solid with a smooth surface.

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11. Which of the following is true during adsorption?

a. ΔG , ΔH , and ΔS all are negative.

b. ΔG is negative, but ΔH and ΔS is positive.

c. ΔG and ΔH are negative, but ΔS is positive.

d. ΔG and ΔS are negative, but ΔH is positive.

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Ex 5 2

1. MECHANISM OF ENZYME CATALYSIS

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2. METHODS FOR THE PREPARATION OF COLLOIDS

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3. PURIFICATION OF COLLOIDAL SOLUTION

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4. Describe the electrical properties of colloidal solution.

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5. What is emulsion? Write its applications.

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6. What is demulsification ?

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7. Describe the cleansing action of soap.

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8. MULTIMOLECULAR COLLOIDS, MACROMOLECULAR AND ASSOCIATED COLLOIDS

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

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10. Zeta potential (or electrokinetic potential) is the

a. Potential required to bring about coagulation of a colloidal sol.

b. Potential required to give the particles a speed of $1 cm s^{-1}$ in the sol.

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11. Blue colour of the sky is due to

a. Adsorption of light by dust particles

b. Reflection of light by dust particles

c. Scattering of light by dust particles

d. Pressure of clouds which are a colloidal dispersion of water particles in air

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Exercises Subjective

1. What happens when persistent dialysis of colloidal solution is carried out?

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2. What type of building blocks are present in the structure of zeolites? What is this structure called?

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3. What do x and m represent in the following expression?

$$\left(\frac{x}{m}\right) = KP^{1/n}$$

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4. Indicate a chemical reaction involving a homogeneous catalyst.

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5. What type of substances form lyophobic sols?

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6. How can we remove moisture from glass apparatus?

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7. The gold numbers of protective colloids $A, B, C,$ and D are $0.04, 0.002, 10$, and 25 , respectively. The protective powers of A, B, C , and D are in the order

A. $A > B > C > D$

B. $B > A > C > D$

C. $D > C > A > B$

D. $D > C > B > A$

Answer:

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8. When $6 \times 10^{-5} g$ of a protective colloid was added to $20 mL$ of a standard gold sol, the precipitation of latter was just prevented on addition of $2 mL$ of $10\,\% \, NaCl$ solution. The gold number of a protective colloid is

A. 3

B. 3×10^{-5}

C. 0.06

D. 0.03

Answer:

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9. In an experiment, addition of $4.0mL$ of $0.005MBaCl_2$ to $16.0mL$ of arsenious sulphide sol just cause the complete coagulation in $2h$. The flocculating value of the effective ion is:

A. Cl^{Θ}, 1.0

B. Cl^{Θ}, 2.0

C. $Ba^{2+}, 1.0$

D. $Ba^{2+}, 0.5$

Answer:

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10. A freshly obtained of SnO_2 is peptized by little of KOH to give a sol. Particles may be represented as

A. $[SnO_2]K^{\oplus}$

B. $[SnO_2]OH^{\Theta}$

C. $[SnO_2]Sn^{4+}$

D. $[SnO_2]SnO_3^{2-}$

Answer:

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Exercises Link Comprehension

1. Collidal solution is a heterogeneous solution which contains particle of intermediate size,

i.e., (diameter between 1 and 1000 nm) colloidal is not a substance but it is a state of a substance which depends upon the molecular size. Colloidal solutions are intermediate between ture solution and suspensions.

The size of the colloidal particles lies in the range

A. $10nm - 1000nm$

B. $10m\mu - 1000m\mu$

C. $1nm - 1000nm$

D. $10^{-5}cm - 10^{-7}cm$

Answer: C

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2. Collidal solution is a heterogeneous solution which contains particle of intermediate size, i.e., (diameter between 1 and 1000 nm) colloidal is not a substance but it is a state of a substance which depends upon the molecular size. Colloidal solutions are

intermediate between ture solution and suspensions.

The colloidal solution of a solid as the disperesed ohases and a gas as the dispersed medium is called

A. Sol

B. Sloid foam

C. Aerosol

D. Gel

Answer: C

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3. Collidal solution is a heterogeneous solution which contains particle of intermediate size, i.e., (diameter between 1 and 1000 nm) colloidal is not a substance but it is a state of a substance which depends upon the molecular size. Colloidal solutions are intermediate between ture solution and suspensions.

The colloidal particle can pass through

A. Filter paper as well can pass through Animal Membrane

B. Animal membrane but not through filter paper.

C. Filter paper but not through animal membrane.

D. Neither filter paper nor animal membrane.

Answer: C

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4. Collidal solution is a heterogeneous solution which contains particle of intermediate size, i.e., (diameter between 1 and 1000 nm) colloidal is not a substance but it is a state of a substance which depends upon the molecular size. Colloidal solutions are intermediate between ture solution and suspensions.

The difference between a lyophilic and lyophobic colloid is their

A. Behaviour towards dispersion medium

B. Filterability

C. Scattering of light

D. Particle size

Answer: A

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5. Collidal solution is a heterogeneous solution which contains particle of intermediate size, i.e., (diameter between 1 and

1000 nm) colloidal is not a substance but it is a state of a substance which depends upon the molecular size. Colloidal solutions are intermediate between ture solution and suspensions.

Chemisorption

A. Increases with temperature

B. Decreases with temperature

C. Remains unaffected by change of temperature.

D. First increases and then decreases.

Answer: D

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6. A chemist studied the phenomenon of adsorption by putting blood charcoal in KCL solution. He observed difference in the behaviour with dilute KCL solution and with concentrated KCL solution. He also studied the adsorption of different gases on solid adsorbent and the effect of temperature on adsorption. He put forward a mathematical

relationship relating x/m with equilibrium pressure.

Which of the following is correct ?

A. Adsorption is always exothermic?

B. Adsorption is always endothermic.

C. Physical adsorption is endothermic whereas chemisorption is exothermic.

D. Chemical adsorption is endothermic whereas physical adsorption is endothermic

Answer: A

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7. A chemist studied the phenomenon of adsorption by putting blood charcoal in KCL solution. He observed difference in the behaviour with dilute KCL solution and with concentrated KCL solution. He also studied the adsorption of different gases on solid adsorbent and the effect of temperature on adsorption. He put forward a mathematical

relationship relating x/m with equilibrium pressure.

Which of the following plot will be liner? (More than one correct)

A. Plot of log x/m versus P

B. Plot of m/x versus $1/P$

C. Plot of log $\frac{P}{m/m}$ versus P

D. Plot of log m/x versus log P

Answer: A::B::C

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8. A chemist studied the phenomenon of adsorption by putting blood charcoal in KCL solution. He observed difference in the behaviour with dilute KCL solution and with concentrated KCL solution. He also studied the adsorption of different gases on solid adsorbent and the effect of temperature on adsorption. He put forward a mathematical relationship relating x/m with equilibrium pressure.

The correct order of the adsorption of gases will be

A. $NH_3 > SO_2 > CO_2 > HCl$

B. $CO_2 > SO_2 > NH_3 > HCl$

C. $SO_2 > NH_3 > HCl > CO_2$

D. $HCl > SO_2 > NH_3 > CO_2$

Answer: C

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9. A chemist studied the phenomenon of adsorption by putting blood charcoal in KCL solution. He observed difference in the behaviour with dilute KCL solution and with concentrated KCL solution. He also studied the adsorption of different gases on solid adsorbent and the effect of temperature on adsorption. He put forward a mathematical relationship relating x/m with equilibrium pressure.

Which of the following result is oberved with the experiment of KCl solution ?

A. Dilute KCl solution shows no adsorption whereas concentrated KCl shows adsorption

B. Concentrated KCl solution shows positive adsorption whereas dilute KCl solution shows negative adsorption.

C. Concentrated KCl solution shows positive adsorption whereas dilute shows negative adsorption.

D. Dilute KCl solution shows positive adsorption whereas concentrated KCl solution shows negative adsorption.

Answer: B

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10. Collidal dispersion have been classified into different types depending upon the physical state of the dispersed phases and the dispersion medium. They are prepared in the

industry or in the laboratory by a number of methods and then purified. The protective action of lyophilic colloids was studied by Zsigmondy and he introduced a term called gold number.

Which of the following does not form a lyophilic colloid?

A. Rubber dissolved in benzene.

B. White or the egg dissolved into water.

C. Common salt added into benzene.

D. Stannous chloride solution added to gold chloride solution.

Answer: D

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11. Collidal dispersion have been classified into different types depending upon the physical state of the dispersed phases and the dispersion medium. They are prepared in the industry or in the laboratory by a number of

methods and then purified. The protective action of lyophilic colloids was studied by Zsigmondy and he introduced a term called gold number.

In the experiment on electro-osmosis in which of the following the level of the dispersion medium will fall on the cathode side.

A. $Fe(OH)_3$ sol

B. As_2S_3 sol

C. Gold sol

D. Starch sol

Answer: A

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12. Collidal dispersion have been classified into different types depending upon the physical state of the dispersed phases and the dispersion medium. They are prepared in the industry or in the laboratory by a number of methods and then purified. The protective action of lyophilic colloids was studied by Zsigmondy and he introduced a term called

gold number.

Criticle micelle concentration (CMC) of saop solution lies in the range.

A. $10^{-6} - 10^{-5} M$

B. $10^{-5} - 10^{-4} M$

C. $10^{-3} - 10^{-2} M$

D. $10^{-4} - 10^{-3} M$

Answer: D

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13. Collidal dispersion have been classified into different types depending upon the physical state of the dispersed phases and the dispersion medium. They are prepared in the industry or in the laboratory by a number of methods and then purified. The protective action of lyophilic colloids was studied by Zsigmondy and he introduced a term called gold number.

Which of the following will have maximum flocculation value for aresnic sulphide sol?

A. $BaCl_2$

B. $NaCl$

C. KCl

D. $AlCl_3$

Answer: B

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14. Collidal dispersion have been classified into different types depending upon the physical state of the dispersed phases and the dispersion medium. They are prepared in the

industry or in the laboratory by a number of methods and then purified. The protective action of lyophilic colloids was studied by Zsigmondy and he introduced a term called gold number.

Which of the following has minimum gold number?

A. Albumen

B. Gelatin

C. Starch

D. Gum arabic

Answer: B

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15. Adsorption is the tendency of accumulation of molecular species at the surface of solid or liquid. Depending upon the nature of bonds or forces of attraction between adsorbate and adsorbent. It is classofied between physisorption and chemisorption.

Which of the following statements are correct? (More than one correct)

A. Adsorption always leads to a decrease in enthalpy and entropy of the system.

B. Adsorption arises due to unsaturation in the enthalpy of valency force of atoms or molecules on the surface.

C. Adsorption increases with rise in temperature.

D. Adsorption decreases the surface energy.

Answer: A::B::D

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16. Adsorption is the tendency of accumulation of molecular species at the surface of solid or liquid. Depending upon the nature of bonds or forces of attraction between adsorbate and adsorbent. It is classofied between physisorption and chemisorption.

Which of the following gas molecules have maximum value enthalpy of physisorption?

A. C_2H_6

B. Ne

C. H_2

D. H_2O

Answer: D

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17. Adsorption is the tendency of accumulation of molecular species at the surface of solid or liquid. Depending upon the nature of bonds or forces of attraction between adsorbate and

adsorbent. It is classofied between physisorption and chemisorption.

Which of the following gases is adsorbed most by activated charcoal?

A. CO_2

B. N_2

C. Ar

D. C_2H_6

Answer: A

Watch Video Solution

18. Adsorption is the tendency of accumulation of molecular species at the surface of solid or liquid. Depending upon the nature of bonds or forces of attraction between adsorbate and adsorbent. It is classofied between physisorption and chemisorption.

Which of the following characteristics is not correct for physical adsorption?

A. Adsorption is spontaneous.

B.

C. It is reversible in nature

D. Degree of adsorption increases with temperature

Answer: D

View Text Solution

19. Substances which alter the velocity of a reaction by mere presence, without undergoing any change in mass and compossition are termed catalyst and the

phenomenon is known as catalysis

According to the adsorption theroy of catalysis, the rate of reaction increases because

A. According to the activation energy of the reaction.

B. Concentration of reactant molecules at the active centres of the catalyst becomes high due to adsorption.

C. Adsorption increases the activation energy of the reaction.

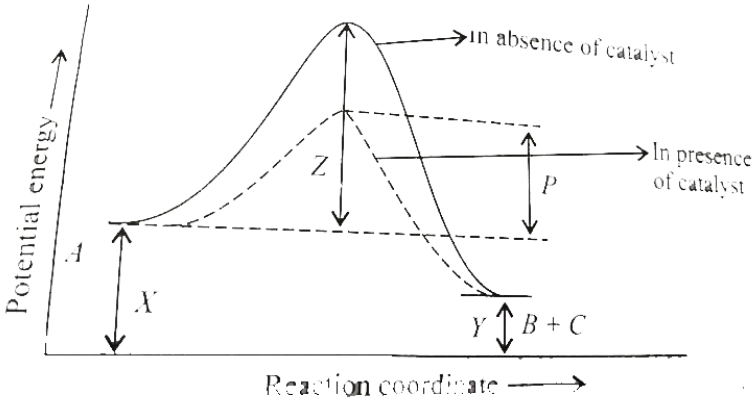
D. Adsorption decreases the activation of the energy of the reaction.

Answer: B

 Watch Video Solution

20. Substances which alter the velocity of a reaction by mere presence, without undergoing any change in mass and compossition are termed catalyst and the phenomenon is known as catalysis

For the reaction $(A \rightarrow B + C)$, the energy profile diagram is given in the figure below.



The decrease in ht eenergy of activation in hte presence of catalyst is

A. Z

B. $Z - P$

C. $Y - Z$

D. $Z - X$

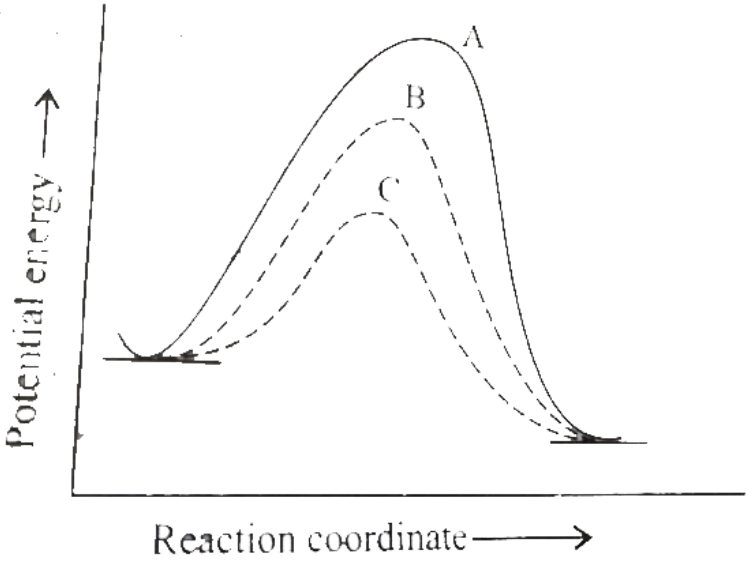
Answer: B

Watch Video Solution

21. Substances which alter the velocity of a reaction by mere presence, without undergoing any change in mass and compossition are termed catalyst and the phenomenon is known as catalysis

In homogenous catalytic reactions, there are

three alternative paths A, B, and C (shown in figure). Which one of the following indicates the relative ease with which the reaction can take place?



A. $A. B. C$

B. $C. B. A$

C. $B. C. A$

D. $A = B = C$

Answer: B

Watch Video Solution

22. Substances which alter the velocity of a reaction by mere presence, without undergoing any change in mass and compossition are termed catalyst and the

phenomenon is known as catalysis

Which is incorrect for a catalyst?

A. A catalyst can initiate a reaction.

B. A catalyst remains uncharged in quality and composition at the end of reaction.

C. It does not alter the position of equilibrium in a reversible reaction.

D. Catalyst are sometimes very specific in reaction.

Answer: A

Watch Video Solution

23. Only the surface atoms in an adsorbent play an active role in adsorption. These atoms possess some residual force such as van der Waals forces and chemical forces. In the process of adsorption. Weak adsorbate is substituting by strong adsorbete. Activated charcoal used in the gas mask is already exposed to the atmospheric air, so gases and water vapours in air are adsorbed on its surface. When the mask is exposed to chlorine

atmosphere, the gases are displaced by chlorine. In general, easily liquefiable gases such as $CO_2, NH_3, Cl_2,$ and SO_2 are adsorbed to a greater extent than the elemental gases, e.g., $H_2, N_2, O_2,$ He, etc.

Gas mask works on the principle of

A. Chemical adsorption

B. Physical adsorption

C. Both physical adsorption and chemical adsorption

D. None of these

Answer: C

 Watch Video Solution

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Gas mask contaons

A. Charcoal granules

B. Calcium carbonate

C. Fuller's earth

D. Powdered charcoal

Answer: D

 Watch Video Solution

25. Only the surface atoms in an adsorbent play an active role in adsorption. These atoms possess some residual force such as van der Waals forces and chemical forces. In the process of adsorption. Weak adsorbate is substituting by strong adsorbete. Activated

charcoal used in the gas mask is already exposed to the atmospheric air, so gases and water vapours in air are adsorbed on its surface. When the mask is exposed to chlorine atmosphere, the gases are displaced by chlorine. In general, easily liquefiable gases such as $CO_2, NH_3, Cl_2,$ and SO_2 are adsorbed to a greater extent than the elemental gases, e.g., $H_2, N_2, O_2,$ He, etc.

Which of the following gases will be most easily adsorbed by the charcoal in the gas mask?

A. H_2

B. SO_2

C. N_2

D. O_2

Answer: B

Watch Video Solution

26. Only the surface atoms in an adsorbent play an active role in adsorption. These atoms possess some residual force such as van der

Waals forces and chemical forces. In the process of adsorption. Weak adsorbate is substituting by strong adsorbete. Activated charcoal used in the gas mask is already exposed to the atmospheric air, so gases and water vapours in air are adsorbed on its surface. When the mask is exposed to chlorine atmosphere, the gases are displaced by chlorine. In general, easily liquefiable gases such as $CO_2, NH_3, Cl_2,$ and SO_2 are adsorbed to a greater extent than the elemental gases, e.g., $H_2, N_2, O_2,$ He, etc.

Which of the following gases will substitute O_2 from adsorbed charcoal?

A. Cl_2

B. N_2

C. CH_4

D. N_2

Answer: A

Watch Video Solution

27. Only the surface atoms in an adsorbent play an active role in adsorption. These atoms possess some residual force such as van der Waals forces and chemical forces. In the process of adsorption. Weak adsorbate is substituting by strong adsorbete. Activated charcoal used in the gas mask is already exposed to the atmospheric air, so gases and water vapours in air are adsorbed on its surface. When the mask is exposed to chlorine atmosphere, the gases are displaced by chlorine. In general, easily liquefiable gases

such as $CO_2, NH_3, Cl_2,$ and SO_2 are adsorbed to a greater extent than the elemental gases, e.g., $H_2, N_2, O_2,$ He, etc.

In physical adsorption, the forces associated are

A. Ionic

B. covalent

C. van der Waals

D. `H-bonding

Answer: C

Watch Video Solution

Watch Video Solution

28. Emulsions are also called the colloidal solutions in which the disperse phase as well as dispersion medium are liquids. It may be oil-in-water or water-inoil type Emulsifiers can be sued to stabilize the emulsion. Soaps, detergents, proteins, and gums are used as emulsifiers.

Which of the following examples is/are oil-in-water-type emulsion?

A. Ink

B. Detergent

C. Soap

D. Milk

Answer: D

 Watch Video Solution

29. Emulsions are also called the colloidal solutions in which the disperse phase as well as dispersion medium are liquids. It may be oil-in-water or water-inoil type Emulsifiers can be

sued to stabilize the emulsion. Soaps, detergents, proteins, and gums are used as emulsifiers.

Emulsion can be destroyed by (more than one correct)

A. The addition of emulsifier which tends to form another emulsion

B. Electrophorsis with high potential

C. Freezing

D. All

Answer: B::C

Watch Video Solution

30. Emulsions are also called the colloidal solutions in which the disperse phase as well as dispersion medium are liquids. It may be oil-in-water or water-inoil type Emulsifiers can be sued to stabilize the emulsion. Soaps, detergents, proteins, and gums are used as emulsifiers.

Butter is an emulsion of type

A. Water in oil

B. Oil in water

C. None

D. N//A

Answer: A

 Watch Video Solution

31. Emulsions are also called the colloidal solutions in which the disperse phase as well as dispersion medium are liquids. It may be oil-

in-water or water-inoil type Emulsifiers can be sued to stabilize the emulsion. Soaps, detergents, proteins, and gums are used as emulsifiers.

Addition of lyophilic solution to the emulsion forms

A. A protective film around the dispersed phase

B. A protective film around the dispersion medium.

C. An aerosol

D. True solution

Answer: A

Watch Video Solution

32. Emulsions are also called the colloidal solutions in which the disperse phase as well as dispersion medium are liquids. It may be oil-in-water or water-inoil type Emulsifiers can be sued to stabilize the emulsion. Soaps, detergents, proteins, and gums are used as

emulsifiers.

Which of the following is homogeneous

A. Milk

B. Paint

C. Shampoo

D. All

Answer: A

 Watch Video Solution

33. There are certain substances which behave as normal, strong electrolyte at low concentration but at higher concentration they behave as colloidal solutions due to the formation of aggeregated particles. Such colloidals called associated colloids and the aggeregated particles are called micelles. The formation of micelles take place above certain concentration called critical micelization concentration called critical micellization concentration (CMC) and a characteristic

temperature.

Micelles are

A. Emulsion-cum-gel

B. Adsorbed catalyst

C. Associated colloids

D. Ideal solutions

Answer: A

 Watch Video Solution

34. There are certain substances which behave as normal, strong electrolyte at low concentration but at higher concentration they behave as colloidal solutions due to the formation of aggeregated particles. Such colloidals called associated colloids and the aggeregated particles are called micelles. The formation of micelles take place above certain concentration called critical micelization concentration called critical micellization concentration (CMC) and a characteristic

temperature.

Micelles are formed only

A. Above CMC and above the Kraft tempareture

B. Below CMC and the Kraft tempareture

C. Above CMC and below the Kraft tempareture

D. Below CMC and above the Kraft tempareture

Answer: A

Watch Video Solution

35. There are certain substances which behave as normal, strong electrolyte at low concentration but at higher concentration they behave as colloidal solutions due to the formation of aggeregated particles. Such colloidals called associated colloids and the aggeregated particles are called micelles. The formation of micelles take place above certain concentration called critical micelization concentration called critical micellization

concentration (CMC) and a characteristic temperature.

Above CMC, the surfactant molecules undergo (more than one correct)

A. Aggregation

B. Micelles formation

C. Dissociation

D. All

Answer: A::B

Watch Video Solution

36. There are certain substances which behave as normal, strong electrolyte at low concentration but at higher concentration they behave as colloidal solutions due to the formation of aggeregated particles. Such colloidals called associated colloids and the aggeregated particles are called micelles. The formation of micelles take place above certain concentration called critical micelization concentration called critical micellization concentration (CMC) and a characteristic

temperature.

What type of molecules form micelles?

A. Non-polar molecules

B. polar molecules

C. Surfactnt molecules

D. Salt of weak acid and weak base

Answer: C

Watch Video Solution

37. There are certain substances which behave as normal, strong electrolyte at low concentration but at higher concentration they behave as colloidal solutions due to the formation of aggeregated particles. Such colloidals called associated colloids and the aggeregated particles are called micelles. The formation of micelles take place above certain concentration called critical micelization concentration called critical micellization concentration (CMC) and a characteristic

temperature.

Micelles are used in

A. Detergents

B. Petroleum recovery

C. Magnetic separation

D. All of these

Answer: A

Watch Video Solution

Exercises Multiple Correct

1. Which of the following statements is/are wrong?

A. Zeolites are hydrated aluminosilicates which can be used as shape-selective catalsts.

B. Enzymes show maximum activity when pH is either very low or very high.

C. Enzymes show maximum activity at room temperature $(20 - 25^{\circ} C)$

D. Chemically, all enzymes are globular proteins.

Answer: A::B::C

Watch Video Solution

2. Which of the following statements is/are not correct ?

A. A catalyst always increases the speed of a reaction.

B. A catalyst does not take part in the reaction.

C. A catalyst may affect the nature of the products formed.

D. A catalyst is always an external substance added to the reaction mixture.

Answer: A::B::D

 Watch Video Solution

3. Which of the following is/are coorectly matched?

A. Butter-gel

B. Milk-emulsion

C. Fog-aerosol

D. Dust-solid sol

Answer: A::B::C

Watch Video Solution

4. Which of the following is/are elastic gel?

A. Gelatin

B. Silicic acid

C. Agar agar

D. Starch

Answer: A::C::D

Watch Video Solution

5. Which of the following is/are negatively charged sol?

A. Gold sol

B. Prussian blue dye

C. Haemolobin

D. Starch

Answer: A::D

View Text Solution

6. Which of the following is/are aerosols?

A. Smoke

B. Milk

C. Butter

D. Fog

Answer: A::D

Watch Video Solution

7. Which of the following increase(s) the activation of a solid adsorbent?

A. Polishing the surface of the solid adsorbent.

B. Subdividing the solid adsorbent.

C. Blowing superheated steam through the porous adsorbent.

D. Adsorbent at very low pressure.

Answer: B::C

Watch Video Solution

8. Which of the following is/are lyphobic colloids?

A. gold sol

B. As_2S_3 sol

C. $Fe(OH)_3$ sol

D. Starch sol

Answer: A::B::C

Watch Video Solution

9. Which of the following statements is/are correct ?

A. Physical adsorption is multilayer, non-directional, and non-specific.

B. On some cases, solvent may be adsorbed in preference to the solute on the surface of the adsorbent.

C. Chemical adsorption increases with increases in temperature.

D. Due to adsorption, surface energy increases.

Answer: A::B

Watch Video Solution

10. Which of the following is/are not correctly matched?

A. Emulsion-curd

B. Foam-mist

C. Aerosol-smoke

D. Solid sol-cake

Answer: A::B::D

Watch Video Solution

11. Which one of the following is/are correct statement for physisorption

A. It is a reversible process.

B. It requires less heat of adsorption.

C. It requires activation energy.

D. It takes place at low temperature.

Answer: A::B::D

Watch Video Solution

12. Which of the following statements is/are correct ?

A. Increases of pressure increases the amount of adsorption.

B. Increases of temperature may decreases the amount of adsorption

C. The adsorption may be monolayered or multilayered.

D. Particle size of the adsorbent will not affect the amount of adsorption.

Answer: A::B::C

 Watch Video Solution

13. Which of the following electrolytes will not be most effective in the coagulation of fold sol?

A. $NaNO_3$

B. $K_4\left[Fe(CN)_6\right]$

C. Na_3PO_4

D. $MgCl_2$

Answer: A::B::C

Watch Video Solution

14. Which of the following are macromolecular colloids?

A. Starch

B. Soap

C. Detergent

D. Cellulose

Answer: A::D

 Watch Video Solution

15. Isoelectric point is the pH at which colloidal particles

A. Coagulate

B. Becomes electrically neutral.

C. Can move toward either electrodes

D. None of these

Answer: A::B::C

Watch Video Solution

16. Tyndall effect is applicable when

A. The diameter of the dispersed particle is not much smaller than the wavelength of the light used.

B. The diameter of the dispersed particles is much smaller than the wavelength of the light used.

C. The refractive indices of the dispersed phase and the dispersed phase and the

dispersion medium must be same.

D. The refractive indices of the dispersed phase and the dispersion medium must differ greatly in magnitude.

Answer: A::D

View Text Solution

17. Multimolecular colloids are present in?

A. Sol of sulphur

B. Sol of protein

C. Sol of gold

D. Soap solution

Answer: A::C

View Text Solution

18. Which of the following belong(s) to the family of enzymes?

A. Lipase

B. Pepsin

C. Ptyalin

D. Cellulose

Answer: A::B::C

Watch Video Solution

19. Which of the following is/are not possible in case of autocatalysis?

A. Reactant catalysis

B. Heat produced in the reaction catalysis

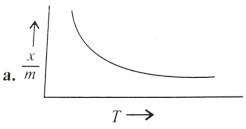
C. Product catalysis

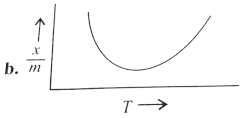
D. Solvent catalysis

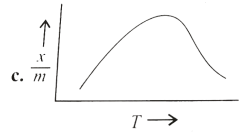
Answer: A::B::D

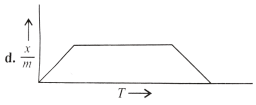
Watch Video Solution

20. Which is not adsorption isobar for chemisorption?

A. 

B. 

C. 

D. 

Answer: A::B::D

Watch Video Solution

21. Which of the following is/are the characteristic of a catalyst?

A. It changes equilibrium point

B. It alter the rate of reaction

C. It initiates the reaction

D. It increases the average KE of molecules

Answer: B::C::D

 Watch Video Solution

22. Which one of the followings is/are an example of homogeneous catalysis?

A. Formation of SO_3 in the chamber process.

B. Formation of SO_3 in the contact process.

C. Hydrolysis of an ester in the present of acid.

D. Decomposition of $KClO_3$ in the presence on Manganese Dioxide

Answer: A::C::D

Watch Video Solution

23. Efficiency of the catalyst does not depend on its?

A. Molecular weight

B. Number of free valencies

C. Physical state

D. Amount used

Answer: A::C::D

Watch Video Solution

24. Which of the following is/are application(s) of adsorption?

A. De-ionization of water

B. Gas masks

C. Hygroscopic nature of $CaCl_2$

D. Heterogeneous catalysis

Answer: A::B::D

Watch Video Solution

25. Which of the following statements is/are correct in the case of heterogenous catalyst?

A. The catalyst lowers the energy of activation.

B. The catalyst actually forms a compound with the reactant.

C. The surface of the catalyst plays a very important role.

D. There is no change in the energy of activation.

Answer: A::B::C

Watch Video Solution

Exercises Single Correct

1. Example of an intrinsic colloid is

A. As_2S_3 sol

B. S sol

C. Egg albumin

D. $Fe(OH)_3$ sol

Answer: C

Watch Video Solution

2. which of the following colloidal systems, fog is an example?

A. Liquid dispersed in gas

B. Gas dispersed in Gas

C. Solid dispersed in gas

D. Solid dispersed in liquid

Answer: A

Watch Video Solution

3. Soaking of water by a sponge is an example of

A. Simple adsorption

B. Physical adsorption

C. Chemisorption

D. Absorption

Answer: D

Watch Video Solution

4. Which one of the following statements is wrong about adsorption?

A. It is a selective and specific process.

B. It is a reversible process.

C. An increase in the gaseous adsorbate causes an increases in a adsorption. However, at high pressure, the adsorption becomes constant.

D. It is an endothermic process.

Answer: D

Watch Video Solution

5. I mol of $[Ag]Ago^{\oplus}$ sol is coagulated by

A. 1 mol of Kl

B. $500mL$ of $1MK_2SO_4$

C. $300mL$ of $1MNa_3PO_4$ solution

D. 1 mol of Agl

Answer: A::D

View Text Solution

6. Arsenic (III) sulphide forms a sol with a negative charge.

Which of the following ionic substances should be most effective in coagulating the sol?

A. KCl

B. $MgCl_2$

C. $Al_2(SO_4)_3$

D. Na_3PO_4

Answer: C

Watch Video Solution

7. Aluminium hydroxide forms a positively charged sol.

Which of the following ionic substances should be most effective in coagulating the sol?

A. $NaCl$

B. $CaCl_2$

C. $Fe_2(SO_4)_3$

D. K_3PO_4

Answer: D

Watch Video Solution

8. Brownian motion is a/an

A. Electrical property

B. Mechanical property

C. Optical property

D. Colligative property

Answer: B

Watch Video Solution

9. The colligative property of a colloidal sol compared to the solution of non-electrolyte of same cancentration will be

A. Same

B. Higher

C. Lower

D. Higher or lower

Answer: C

Watch Video Solution

10. Which of the following act as a protective colloids?

A. Gelatin

B. Silica gel

C. Oil-in-water emulsion

D. All correct

Answer: A

View Text Solution

11. An emulsifier is an agenet which

A. Accelerates the dispersion

B. Homogenizes an emulsion

C. Stabilizes an emulsion

D. Aids the flocculation of an emulsion

Answer: B

Watch Video Solution

12. The stabilization of a dispersed phase in a lyopobic colloid is due to

A. The adsorption of charged substances on dispersed phase.

B. The large electro-Kinetic potential developed in the colloid.

C. The formation of an electrical layer between two phase.

D. The viscosity of the medium

Answer: C

 Watch Video Solution

13. The diameter of collodal particle is of the order

A. $10^{-3}m$

B. $10^{-6}m$.

C. $10^{-15}m$.

D. $10^{-7}m$

Answer: D

Watch Video Solution

14. The process of passing of a precipitate into colloidal solution on adding an electrolyte is called

A. Dialysis

B. Peptization

C. Electrophoresis

D. Electro-osmosis

Answer: B

 Watch Video Solution

15. Tyndall effect is not observed in

A. Suspension

B. True solution

C. Emulsions

D. Colloidal solution

Answer: B

 Watch Video Solution

16. The process of removing dissolved impuities from a colloidal system by means of diffusion through suitable membrane under the influence of an electric field os called

A. Electro-osmosis

B. Electrodialysis

C. Eleetrophoresis

D. Peptization

Answer: B

Watch Video Solution

Watch video solution

17. The migration of positively charged colloidal particles, under an electrical field, towards the cathode is called

A. Cataphoresis

B. Electro-osmosis

C. Sedimentation

D. Electrodialysis

Answer: A

Watch Video Solution

18. Smoke is a dispersion of

A. Gas in gas

B. Gas is solid

C. Solid in gas

D. Liquid in gas

Answer: C

Watch Video Solution

19. The colloidal sol of As_2S_3 prefers to adsorb

A. NO_3^{Θ}

B. $K^{\oplus}$

C. S^{2-}

D. $H^{\oplus}$

Answer: C

Watch Video Solution

20. A freshly formed ppt of SnO_2 is peptized by a small amount of $NaOH$. These colloidal particles may be represented as

A. $[SnOH_2]SnO_3^{2-}, 2Na^{\oplus}$

B. $[SnOH_2]Sn^{4+}, O^{2-}$

C. $[SnOH_2]Na^{\oplus}, OH^{\Theta}$

D. $[SnO_2]Sn^{4+}, OH^{\Theta}$

Answer: A

Watch Video Solution

21. Smoke has generally blue tinge. It is due to

A. Scattering

B. Coagulation

C. Brownian motion

D. Electro-osmosis

Answer: A

Watch Video Solution

22. Adsorption is a process in which a substance accumulates on the ..... of the other substance.

A. Accumulates on the phenomenon in which substance

B. Goes into the body of the other substance

C. Remains close to the other substnace

D. None is correct

Answer: A

Watch Video Solution

23. What is sorption.

A. Adsorption takes place

B. Adsorption takes place

C. Both take place

D. Desorption takes place

Answer: C

Watch Video Solution

24. In the adsorption of oxalic acid on activated charcoal, the activated charcoal is called

A. Adsorbent

B. Adsorbate

C. Adsorber

D. Absorber

Answer: A

Watch Video Solution

25. There is desorption of physical adsorption when

A. Temperature is increased

B. Temperature is decreased

C. Pressure is increased

D. Concentration is increased

Answer: A

Watch Video Solution

26. The rate of chemisorption

a. increases with decreases in temperature

b. increases with increases in temperature

c. increases with decreases in the pressure of gas

d. is independent of the pressure of gas

A. Decreases with increases of pressure

B. Increases with increases of pressure

C. Is independent of pressure

D. Is independent of temperature

Answer: B

Watch Video Solution

27. Which of the following is not a characteristic of chemisorption?

A. It is irreversible.

B. It is specific.

C. It is multilayer phenomenon.

D. Heat of adsorption is about $-400KJ$.

Answer: C

Watch Video Solution

28. Chromatography is a technique based on.

A. Adsorption and then desorption of solute

B. Absorption of solute

C. Hydration of solute

D. Evaporation of solute

Answer: A

Watch Video Solution

29. Oil-soluble dye is mixed with water-in-oil emulsion, then

A. Dispersion medium is coloured

B. Dispersed phase is coloured

C. Both coloured

D. None is coloured

Answer: A

Watch Video Solution

30. An oil-soluble dye is mixed with emulsion and the emulsion remains colourless. Then, it is

A. O-in-W

B. W-in-O

C. O-in-O

D. W-in-W

Answer: A

Watch Video Solution

31. There is no scum formation when hard water is being used. The washing powder can be

A. $C_{17}H_{35}COONa$

B. 

View Text Solution

32. Amount of gas adsorbed per gram of adsorbent increases with pressure, but after a certain limit is reached, adsorption becomes constant. It is where

A. Multilayers are formed

B. Desorption takes place

C. Temperature is increased

D. Adsorption also start

Answer: A

Watch Video Solution

33. Softening of hard water is done using sodium aluminium silicate (zeolite) . This causes

A. Adsorption of Ca^{2+} and Mg^{2+} ions of hard water replacing $Na^{\oplus}$ ions.

B. Adsorption of Ca^{2+} and Mg^{2+} ions of hard water replacing Al^{3+} ions.

C. Both (a) and (b) are true

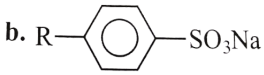
D. None is true

Answer: A

Watch Video Solution

34. Anionic surfactants are

A. $C_{15}H_{31}COONa$

B. 

C. $C_{18}H_{37}NH_3Cl$

D. All

Answer: A::B

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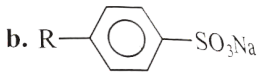
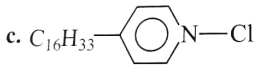
35. Cationic surfactants are

A. $C_{17}H_{35}COONa$

B. 

C. 

D. $C_{16}H_{33}N(CH_3)_3Cl$

Answer: C::D

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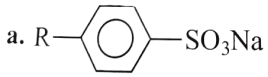
36. Mnon-ionogenic surfactants are

A. 

B. $C_{17}H_{35}COONa$

C. $C_nH_{2n+1}(OCH_2CH_2)_xOH$

D. All

Answer: C

37. Micelles are

A. Ideal solution

B. Associated colloids

C. Adsorbed surface

D. Absorbent solutions

Answer: B

38. Compared to common colloidal sols milcells have:

A. Higher colligative properties

B. Lower colligative properties

C. Same colligative properties

D. None is ture

Answer: B

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39. Which one of the following statements is correct?

A. Brownian movement is more pronounced for smaller particles than for bigger ones.

B. Sols of metal sulphides are lyophilic.

C. Hardy Schulze law states, the bigger the size of the ions, the greater is its coagulating power.

D. One would expect charcoal to adsorb chlorine more strongly than hydrogen sulphide.

Answer: A

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40. Catalyst increases the rate by

A. Decreasesing E_a

B. Increasing E_a

C. Decreasing entropy

D. Increasing entropy

Answer: A::C

Watch Video Solution

41. Which of the following catalyst is used during the hydrogenation of oil?

A. Fe

B. Ni

C. Pt

D. Mo

Answer: B

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42. Which of the following is present at the time of cracking of hydrocarbons?

A. Copper

B. Zeolite

C. Nickel

D. Molybdenum

Answer: A

View Text Solution

43. Which is not the correct statement for a catalyst?

A. It does not alter E_a .

B. The surface of a catalyst adsorbs reactant

C. Catalyst may form intermediates with reactants.

D. Action of enzyme catalyst is always specific.

Answer: C

44. Catalyst used in polymerization of ethen is:

A. $TiCl_4$ and AIR_3

B. Fe, Co

C. H_3PO_4

D. `Zeolites

Answer: A

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45. Gold number of a lyophic sol is such a property that

A. The larger its value, the greater is the peptizing power.

B. The lower its value, the greater is the peptizing power.

C. The lower its value, the greater is the peptizing power.

D. The larger its value, the greater is the protecting power.

Answer: C

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46. Energy of activation of forward and backward reaction are equal in case (numerical calues) where

A. $\Delta H = 0$

B. No catalyst present

C. $\Delta S = 0$

D. Stoichiometry is the mechanism

Answer: A

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47. Which one of the following is a nature colloid?

A. Sodium chloide solution

B. Cane sugar solution

C. Urea solution

D. Blood

Answer: D

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48. Collidal solutios of gold prepared by different methods are of different colours because of

A. Different diameters of colloidal gold particles

B. Variable valency of gold

C. Different concentrations of gold particles

D. Impurites produced by different methods

Answer: A

View Text Solution

49. Bleeding is stopped by the application of ferric chloride. This is because

A. The blood starts flowing in opposite direction.

B. The blood reacts and forms a solid, which seals the blood vessel.

C. The blood is coagulated and thus the blood vessel is sealed.

D. The ferric chloride scals the blood vessel.

Answer: C

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50. If liquid is dispersed in solid medium, then this is called as:

A. Sol

B. Emulsion

C. Liquid aerosol

D. Gel

Answer: D

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51. Freundlich equation for adsorption of gases (in amount of Xg) on a solid (in amount od mg) 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. $\frac{X}{m} = \log P + \frac{1}{n} \log K$

Answer: B

52. Which of the folloing statemenrts is incorrect regarding physisorption?

A. It occurs because of van der Waals forces.

B. Liquefiable gases are adsorbed more easily.

C. Under high pressure it result surface.

D. Enthalpy of adsorption $(\Delta H_{\text{adsorption}})$ is low and positive.

Answer: D

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Exercises Assertion Reasoning

1. Assertion(A): Fe^{3+} can be used for coagulation of As_2S_3 sol.

Reason (R): Fe^{3+} reacts with As_2S_3 to give Fe_2S_3.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is the not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: C

 Watch Video Solution

2. Assertion(A): Aqueous gold colloidal solution is red in colour.

Reason(R): The colour arises due to scattering of light by colloidal gold particles.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct. S

Answer: A

View Text Solution

3. Assertion(A): Physical adsorption of milecules on the surface requires activation energy.

Reason(R): Because the bonds of adsorbed molecules are broken.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct. S

Answer:

Watch Video Solution

4. Assertion(A): Langmuir adsorption is a single-layer phenomenon.

Reason(R): It is due to van der Waals forces.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: C

5. Assertion(A): Small quanity of soap is used to prepare a stable emulsion.

Reason(R): Soap lowers the interfacial tension between oil and water.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct. S

Answer: A

Watch Video Solution

6. Assertion(A): The micelle formed by sodiumm stearate in water has -COO groups at the surface.

Reason(R): Surface tension of water is reduced by addition of stearate.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct. S

Answer: A

7. Assertion(A): Alcohols are dehydrated to hydrocarbons in the pressure of acidie zeolites.

Reason(R): Zeolites are porous catalysts.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct. S

Answer: C

View Text Solution

8. Assertion(A): Activity of an enzyme is pH dependent.

Reason(R): Change in pH affects the solution of the enzyme in water.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: C

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9. Assertion(A): A reaction cannot become fast by itself unless a catalyst is added.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct. S

Answer:

View Text Solution

10. Assertion(A): A catalyst speed up a reaction but does not participate in its mechanism.

Reason(R): A catalyst provides an alternative path of lower activation energy to the reactants.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct. S

Answer:

Watch Video Solution

11. Assertion(A): Fruit formation process shows increase in the rate with passage of time.

Reason(R): Hydrolysis os these ester is homogeneous autocatalytic reaction.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct. S

Answer: A

View Text Solution

12. Assertion(A): Catalysts are aways transition metals.

Reason(R): Trasition metals have varitable oxidation state.

A. If both (A) and (R) are correct, and (R) is not the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct. S

Answer: B

13. Assertion(A): The mass of nickle catalyst recovered after being used in the hydroenation of an oil is less than the mass of nickle added to the reaction.

Reason(R): Catalyst take part in the reaction but the are recoveres in the end.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct. S

Answer: D

View Text Solution

14. Assertion(A): All enzymes are proteins, but all proteins are not enzymes.

Reason(R): Enzymes are biocatalysts and posses a stable configuration having active sites.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct. S

Answer: D

 Watch Video Solution

15. Assertion(A): The pressence of a catalyst increases the speed of the forward and backward reactions to the same extent.

Reason(R): Activation energy for both the forward and backward reactions is lowered to same extent.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct. S

Answer: A

View Text Solution

16. Assertion (A): Hydrolyiss of ethyl acetate in the presence of acid is a reaction of first order whereas in the presence of alkali, it is a reaction

of second order.

Reason (R): Acid acts as catalyst only whereas alkali act as one of the reactant.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct. S

Answer: A

Watch Video Solution

17. Assertion(A): In chemisorption, adsorption keeps on increasing with temperature.

Reason(R): Heat keeps on providing more and more activation energy.

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct. S

Answer:

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Exercises Interger

1. From the given following sol how many can coagulate the haemoglobin sol?

$Fe(OH)_3, Ca(OH)_2, Al(OH)_3,$ starch, clay, $As_2S_3, CdS,$ basic dye.

A. 1

B. 3

C. 4

D. 8

Answer: C

Watch Video Solution

2. From the given following sol how many can coagulate silica acid sol?

$Fe(OH)_3, Ca(OH)_2, Al(OH)_3,$ starch, clay, $As_2S_3, CdS,$ basic dye.

A. 4

B. 3

C. 2

D. 8

Answer: A

Watch Video Solution

Watch Video Solution

3. For the coagulation of $500mL$ of arsenious sulphide sol, $2mL$ of $1MNaCl$ is required. What is the flocculation value of $NaCl$?

A. 3

B. 2

C. 5

D. 4

Answer: D

Watch Video Solution

4. The coagulation of $100mL$ of a colloidal solution of gold is completely prevented by the addition of $0.030g$ of it before adding $1mL$ of $10\,\%\,NaCl$ solution. Find out the gold number of starch?

A. 4

B. 8

C. 3

D. 9

Answer: A

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5. The gold number of gelatin is 0.01 . Calculate the amount of gelatin to be added to $1000mL$ of a colloidal sol of gold to prevent its coagulation, before adding $1mL$ of $10\ \%\ NaCl$ solution.

A. 2

B. 1

C. 4

D. 5

Answer: B

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6. $526.3mL$ of $0.5mHCl$ is shaken with $0.5g$ of activated charcoal and filtered. The concentration of the filtrate is reduced to $04m$. The amount of adsorption (x/m) is

A. 3

B. 6

C. 8

D. 4

Answer: D

7. In an experiment, addition of $5.0mL$, of $0.006MBaCl_2$ to $10.0mL$ of arsenic sulphite sol just causes the complete coagulation in $34h$. The flocculating value of the effective ion is:

A. 2

B. 3

C. 4

D. 5

Answer: A

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

axis was found to be 0.301 . Calculate the amount of the gas adsorbed per gram of charcoal under a pressure of 3.0 atm.

A. 4

B. 2

C. 6

D. 8

Answer: C

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Exercises Fill In The Blanks

1. Adsorption is a process in which a substance accumulates on the ..... of the other substance.

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2. In adsorption, the substance which acculates on the surface of the other substance is termed as.....

Watch Video Solution

3. Physical adsorption is appeciable at.....temperature,

Watch Video Solution

4. Chemisortion is..... while physical adsorption adsorption is ..... In nature.

Watch Video Solution

5. Chromatography is a technique based on..... Adsorption of defferent constituents of mixture.

View Text Solution

6. Which of the following is true during adsorption?

a. ΔG , ΔH , and ΔS all are negative.

b. ΔG is negative, but ΔH and ΔS is positive.

c. ΔG and ΔH are negative, but ΔS is positive.

d. ΔG and ΔS are negative, but ΔH is positive.

Watch Video Solution

7. A cusrve showing the variation of extent of adsorption with temperature at constant pressure is called.....

Watch Video Solution

8. Chemisorption forms ..... Molecular layers

.

Watch Video Solution

9. In auto-catalysis one of the..... Of the reaction acts as a catalyst.

Watch Video Solution

10. A catalyst promoter..... The efficiency of a catalyst while a poison..... The efficiency of the catalyst.

Watch Video Solution

11. Rough surfaces have more..... Centres on account of free valencies.

Watch Video Solution

12. Intermediate compound formation theory explans..... Catalysis.

Watch Video Solution

13. Heterogeneous catalysis is successfully explained by..... Theory.

Watch Video Solution

14. Enzymes are highely.....in action.

Watch Video Solution

15. Chemical equilibrium is..... by a catalyst.

Watch Video Solution

16. TEL, tetraethyl lead, acts as antiknocking agent. It acts as..... catalyst.

Watch Video Solution

17. Finely powered or colloidal catalyst particles having.....surface.....are rich in ..... valencies.

Watch Video Solution

18. Colloids represent a state of .....and not a class od substances.

Watch Video Solution

19. Colloids consist of.....phase, viz, ...and ..... .

Watch Video Solution

20. Smoke is a colloidal system of dispersed in ..... . This system is temed as.....

Watch Video Solution

21. Blood is a ..... charged sol.

Watch Video Solution

22. The sky looks blue due to ..... effect.

Watch Video Solution

23. Migration of colloidal particles under the influence of electrie field is known as.....

Watch Video Solution

24. According to Hardy Schulze rule, the power of coagulation of an ion depends upon.....

Watch Video Solution

25. The emulsoid which is added to suspensoid to prevent flocculation is called.....

Watch Video Solution

26. The ability of the protective colloid is measured in terms of.....

Watch Video Solution

27. The process of removing dissolved substance from a colloidal solution by means of diffusion through a suitable membrane is termed as.....

Watch Video Solution

28. The dispersion medium in aerosol is.....

Watch Video Solution

29. The phenomenon of scattering of light by colloidal particle is celled.....

Watch Video Solution

30. Bleeding is stopped by the application of ferric chloride. This is due to ..... Of blood.

Watch Video Solution

31. Gold number is minimum in case of.....

Watch Video Solution

32. The phenomenon of converting colloidal solution into suspension is known as.....

Watch Video Solution

33. Colloidal system shows extensive adsorption due to large .....

Watch Video Solution

34. A metal is in the form of dispersed phase and water is the dispersion medium. The colloid is termed as.....

Watch Video Solution

35. The zing-zagmotion of colloidal particle is called.....

Watch Video Solution

36. The liquid-liquid colloidal dispersions are called.....

Watch Video Solution

37. The enthalpy of chemisorption is ..... Than the enthalpy of physisorption.

Watch Video Solution

Exercises True False

1. Peptization is reverse of coagulation.

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2. Milk is an emulsion of W/O type.

Watch Video Solution

3. Gold sol is prepared by Breding's arc method.

Watch Video Solution

4. Viscosity of lyohilic colloidal solution is same as that of dispersion medium.

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5. Collidal solution is a heterogeneous solution which contains particle of intermediate size, i.e., (diameter between 1 and 1000 nm) colloidal is not a substance but it is a state of a substance which depends upon the molecular size. Colloidal solutions are intermediate between true solution and suspensions.

The colloidal particle can pass through

 Watch Video Solution

6. Colloidal solution of a liquid dispersed in solid is called gel.

Watch Video Solution

7. Gelatin has the minimum protective powers.

Watch Video Solution

8. The charge on the colloidal particle is due to preferential adsorption of inos.

Watch Video Solution

9. The charge on the colloidal particles does not account for the stability sols.

10. Metal sol is negatively charged.

11. Adsorption is aways exothermic.

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12. Assertion(A): All enzymes are proteins, but all proteins are not enzymes.

Reason(R): Enzymes are biocatalysts and posses a stable configuration having active sites.

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13. Promoters are substances which increases the efficiency of catalyst.

Watch Video Solution

14. Actication energy is always lowered by positive catalyst.

Watch Video Solution

15. In physical adsorption, the molecules of adsorbate are held by chemical forces.

Watch Video Solution

16. In physical adsorption, the molecules of adsorbate are held by chemical forces.

Watch Video Solution

17. Combination of N_2 and H_2 in the presence of Fe as a catalyst is an example of heterogeneous catalysis.

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18. Acetic acid formed during hydrolysis of ester acts as an induced catalyst.

Watch Video Solution

19. The activity of enzyme is increased in the presence of certain substances known as co-enzymes or acticators.

Watch Video Solution

20. A caatalyst remains unchanged chemically and physically at the end of the reaction.

View Text Solution

Archives Multiple Correct

1. The correct statement(s) pertaining to the adsorption of a gas on a solid surface is (are)

A. Adsorption is always exothermic.

B. Physisorption may transform into chemisorption at high temperature.

C. Physisorption increases with increasing temperature but chemisorption decreases with increasing temperature.

D. Chemisorption is more exothermic than physisorption, however, it is very slow due to higher energy of activation.

Answer: A::B::D

2. Choose the correct reason(s) for the stability of the lyophobic colloidal particles.

A. Preferntial adsorption of ions on their surface from the solution.

B. Preferntial adsorption of solvent on their surface from the solution.

C. Attraction between difference particle having opposite charges on their surface.

D. Potential difference between the fixed layer and the diffused layer of opposite charges around the colloidal particles.

Answer: A::D

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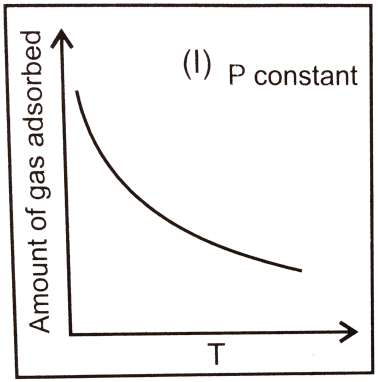
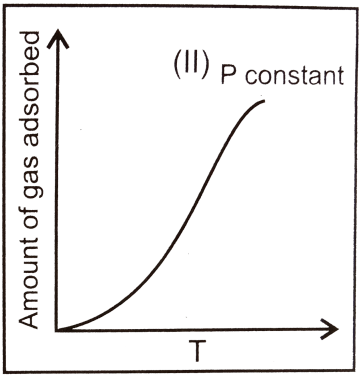
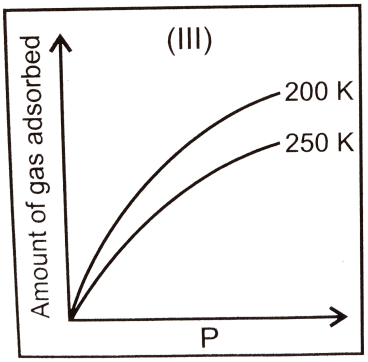
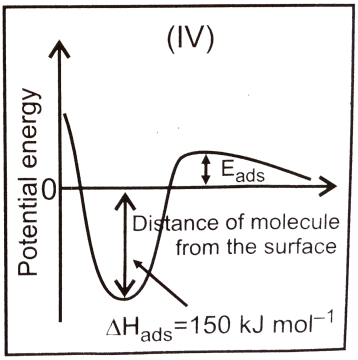
3. The given graphs//data I, II, II and IV pepresent general terends obseved of diffent physiorpton and chemisorption processes under mild conditions of temperature and pressure ,

which of the following choice (s) about I, II, II anIV is (are) correcty ?









A.

B.

C.

D. 

Answer: A::C

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Archives Single Correct

1. The rate of physisorption increases with

A. Decrease in temperature

B. Increase in temperature

C. decrease in pressure

D. Decrease in surface area

Answer: A

2. Lyophilic sols are

A. Irreversible sols

B. Prepared from inorganic compounds

C. Coagulated by adding electrolytes

D. Self-stabilizing

Answer: D

3. Among the following, which surfactant will form micelles in aqueous solution at the lowest molar concentration at ambient conditions?

A. $CH_3(CH_2)_{15}N^{\oplus}(CH_3)_3Br^{\Theta}$

B. $CH_3(CH_2)_{11}OSO_3^{\Theta}Na^{\oplus}$

C. $CH_3(CH_2)_6COO^{\Theta}Na^{\oplus}$

D. $CH_3(CH_{12})_{11}N^{\oplus}(CH_3)_3Br^{\Theta}$

Answer: A

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4. Among the following electrolytes, which is the most effective coagulation agent for Sb_2S_3 solution?

A. Na_2SO_4

B. $CaCl_2$

C. $Al_2(SO_4)_3$

D. NH_4Cl

Answer: C

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5. The coagulating power of electrolytes having inos $Na^{\oplus}$, Al^{3+} and Ba^{2+} for arsenic sulphide sol increases in the order

A. $Na^{\oplus} < Ba^{2+} < Al^{3+}$

B. $Ba^{2+} < Na^{\oplus} < Al^{3+}$

C. $Al^{3+} < Na^{\oplus} < Ba^{2+}$

D. $Al^{3+} < Ba^{2+} < Na^{\oplus}$

Answer: A

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6. Methylene blue, from its aqueous solution, is adsorbed on activated charcoal at $25^{\circ}C$. For process, the correct statement is

A. The adsorption requires activation at $25^\circ C$

B. The adsorption is accomanied by a decrease in enthalpy

C. The adsorption increases with increases of temperature

D. The adsorption is irreversible

Answer: B

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Archives Assertion Reasoning

1. Assertion (A): Micelles are formed by surfactant molecules above the critical micellization concentration (CMC) .

Reason(R): The conductivity of a solution having surfactant molecules decreases sharply at the CMC .

A. If both (A) and (R) are correct, and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is incorrect, but (R) is correct.

D. If both (A) and (R) are incorrect.

Answer: B

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Archives Fill In The Blanks

1. The adsorption of a gas by palladium is commonly known as .....

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Archives Subjective

1. Twenty precent of the surface sites of a catalyst is occupied by nitrogen molecules. The density of surface sites is $6.023 \times 10^{14} cm^{-2}$. The total sarface area is $1000 cm^2$. The catalyst is

is henced to $300K$ and nitrogen is completely desorbed a pressure of 0.001 atm and volume of $2.46cm^3$. Calculate the number of sites occupied by niitrogen molecules.

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2. $1g$ charcoal is placed in $100mL$ of $0.5MCH_3COOH$ to form an adsorbed mono-layer of acetic acid molecule and thereby the molarity of CH_3COOH reduces to 0.49. Calculate the surface area of charcoal adsorbed

by each molecule of acetic acid. Surface are of charocal $= 3.01 \times 10^2 m^2/g.$

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