



# CHEMISTRY

## BOOKS - U-LIKE CHEMISTRY (HINGLISH)

### SURFACE CHEMISTRY

#### Ncert Intext Questions

1. Why are substances like platinum and palladium often used for carrying out

electrolysis of aqueous solutions ?



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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 adsorbent than their crystalline forms ?



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4. In Haber's process, hydrogen is obtained by reacting methane with steam in presence of NiO as catalyst. The process is known as steam reforming. Why is it necessary to remove CO when ammonia is obtained by Haber's process ?



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5. Why is the ester hydrolysis slow in the beginning and becomes faster after sometime?



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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 in the Hardy-Schulze law ?



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



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

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2. What is an adsorption isotherm ? Describe Freundlich adsorption isotherm.

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



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4. What role does adsorption play in heterogeneous catalysis?



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5. Why is adsorption always exothermic ?



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6. Discuss the effect of pressure and temperature on the adsorption of gases on solids.



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7. What are lyophilic and lyophobic sols ? Give one example of each type. Why are hydrophobic sols easily coagulated ?







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8. What is the difference between multimolecular and macromolecular colloids? Give one example of each. How are associated colloids different from these two types of colloids ?



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9. What are enzymes ? Write in brief the mechanism of enzyme catalysis.



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**10.** Explain what is observed when a beam of light is passed through a colloidal sol.



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**11.** Explain what is an electrolyte, NaCl is added to sol.



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**12.** Explain what is electric current is passed through a colloidal sol ?



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**13.** What is demulsification ? Name two demulsifiers.



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

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**15.** Give four examples of heterogeneous catalysis.

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

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**17.** Describe some features of catalysis by zeolites.

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**18.** What is shape selective catalysis ?



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**19.** Give four uses of emulsions.



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**20.** What are micelles ? Give an example of a micellers system.



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**21.** Explain the terms with suitable examples:

(i) Alcosol (ii) Aerosol and (ii) Hydrosol.



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



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**Case Based Source Based Integrated Questions**

1. Read the given passage and answer the questions that follow :

Surface chemistry deals with the phenomena that occur at the surfaces or interfaces. The interface or surface is represented by separating the bulk phases by a hyphen or a slash. For example, the interface between a solid and a gas may be represented by solid-gas or solid/gas. Due to complete miscibility, there is no interface between the gases. The bulk phases that we come across in surface chemistry may be pure compounds or



solutions. The interface is normally a few molecules thick but its area depends on the size of the particles of bulk phases. Many important phenomena, noticeable among these being corrosion, electrode processes, heterogeneous catalysis, dissolution and crystallisation occur at interfaces. The subject of surface chemistry finds many applications in industry, analytical work and daily life situations.

How do you define surface chemistry?



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2. Read the given passage and answer the questions that follow :

Surface chemistry deals with the phenomena that occur at the surfaces or interfaces. The interface or surface is represented by separating the bulk phases by a hyphen or a slash. For example, the interface between a solid and a gas may be represented by solid-gas or solid/gas. Due to complete miscibility, there is no interface between the gases. The bulk phases that we come across in surface chemistry may be pure compounds or

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Can oxygen/hydrogen form interface ?



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**3.** Read the given passage and answer the questions that follow :

Surface chemistry deals with the phenomena that occur at the surfaces or interfaces. The interface or surface is represented by separating the bulk phases by a hyphen or a slash. For example, the interface between a solid and a gas may be represented by solid-gas or solid/gas. Due to complete miscibility, there is no interface between the gases. The bulk phases that we come across in surface chemistry may be pure compounds or

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What are the dimensions of the interface and its surface area ?



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4. Read the given passage and answer the questions that follow :

Surface chemistry deals with the phenomena that occur at the surfaces or interfaces. The interface or surface is represented by separating the bulk phases by a hyphen or a slash. For example, the interface between a solid and a gas may be represented by solid-gas or solid/gas. Due to complete miscibility, there is no interface between the gases. The bulk phases that we come across in surface

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Which phenomena are studied under surface chemistry ?



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5. Read the given passage and answer the questions that follow :

Surface chemistry deals with the phenomena that occur at the surfaces or interfaces. The interface or surface is represented by separating the bulk phases by a hyphen or a slash. For example, the interface between a solid and a gas may be represented by solid-gas or solid/gas. Due to complete miscibility, there is no interface between the gases. The



bulk phases that we come across in surface chemistry may be pure compounds or solutions. The interface is normally a few molecules thick but its area depends on the size of the particles of bulk phases. Many important phenomena, noticeable among these being corrosion, electrode processes, heterogeneous catalysis, dissolution and crystallisation occur at interfaces. The subject of surface chemistry finds many applications in industry, analytical work and daily life situations.

Which out of adsorption, catalysis and colloids is studied under surface chemistry ?



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6. Read the given passage and answer the questions that follow :

In adsorption, the substance is concentrated only at the surface and does not penetrate through the surface to the bulk of the adsorbent, while in absorption, the substance is uniformly distributed throughout the bulk

of the solid. For example, when a chalk stick is dipped in ink, the surface retains the colour of the ink due to adsorption of coloured molecules while the solvent of the ink goes deeper into the stick due to absorption. On breaking the chalk stick, it is found to be white from inside. A distinction can be made between absorption and adsorption by taking an example of water vapour. Water vapours are absorbed by anhydrous calcium chloride but adsorbed by silica gel. In other words, in adsorption the concentration of the adsorbate increases only at the surface of the

adsorbent, while in adsorption the concentration is uniform throughout the bulk of the solid.

What is adsorption ?



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adsorption the concentration of the adsorbate increases only at the surface of the adsorbent, while in adsorption the concentration is uniform throughout the bulk of the solid.

A substance when placed in a solution reveals that the solution has made the whole of the substance wet. What kind of phenomenon is this?



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**8.** Read the given passage and answer the questions that follow :

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Give one example of a substance which shows



adsorption and one example of a substance which shows absorption.



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**9.** Read the given passage and answer the questions that follow :

In adsorption, the substance is concentrated only at the surface and does not penetrate through the surface to the bulk of the adsorbent, while in absorption, the substance is uniformly distributed throughout the bulk

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adsorbent, while in adsorption the concentration is uniform throughout the bulk of the solid.

Can you cite an example where adsorption and absorption take place ?



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**10.** Read the given passage and answer the questions that follow :

In adsorption, the substance is concentrated only at the surface and does not penetrate

through the surface to the bulk of the adsorbent, while in absorption, the substance is uniformly distributed throughout the bulk of the solid. For example, when a chalk stick is dipped in ink, the surface retains the colour of the ink due to adsorption of coloured molecules while the solvent of the ink goes deeper into the stick due to absorption. On breaking the chalk stick, it is found to be white from inside. A distinction can be made between absorption and adsorption by taking an example of water vapour. Water vapours are absorbed by anhydrous calcium chloride

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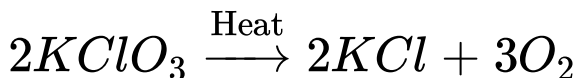
What is the term used when both adsorption and absorption occur ?



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**11.** Read the given passage and answer the questions that follow :

Potassium chlorate, when heated strongly decomposes slowly giving dioxygen. The decomposition occurs in the temperature range of 653-873 K.



However, when a little of manganese dioxide is added, the decomposition takes place at a considerably lower temperature range, i.e., 473-633 K and also at a much accelerated rate.

The added manganese dioxide remains

unchanged with respect to its mass and composition. In a similar manner, the rates of a number of a chemical reactions can be altered by the mere presence of a foreign substance.

The systematic study of the effect of various foreign substances on the rates of chemical reactions was first made by Berzelius, in 1835. He suggested the term catalyst for such substances.

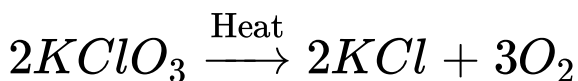
Who made a systematic study of the effect of foreign substances on the rates of chemical reactions and when ?



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12. Read the given passage and answer the questions that follow :

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However, when a little of manganese dioxide is added, the decomposition takes place at a considerably lower temperature range, i.e.,



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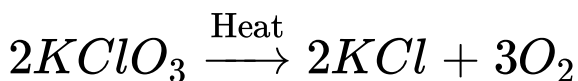
What is the utility of catalysts?



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**13.** Read the given passage and answer the questions that follow :

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However, when a little of manganese dioxide is added, the decomposition takes place at a considerably lower temperature range, i.e.,

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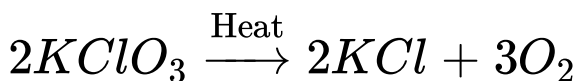
What happens to the catalyst after reactions ?



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**14.** Read the given passage and answer the questions that follow :

Potassium chlorate, when heated strongly decomposes slowly giving dioxygen. The decomposition occurs in the temperature range of 653-873 K.



However, when a little of manganese dioxide is added, the decomposition takes place at a considerably lower temperature range, i.e.,

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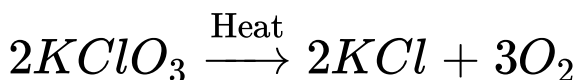
Give another example of a reaction and the catalyst used in the reaction.



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**15.** Read the given passage and answer the questions that follow :

Potassium chlorate, when heated strongly decomposes slowly giving dioxygen. The decomposition occurs in the temperature range of 653-873 K.



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The systematic study of the effect of various foreign substances on the rates of chemical reactions was first made by Berzelius, in 1835.

He suggested the term catalyst for such substances.

How the catalyst is able to lower down the temperature of reaction ?



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## Multiple Choice Questions

1. Electrokinetic potential is the potential difference between



A. the fixed layer and diffused layer.

B. the electrodes of Daniel cell.

C. the electrodes of fuel cell.

D. None of the above.

**Answer: A**



**View Text Solution**

2. Which of the following does not form negatively charged sol ?

A.  $Sb_2S_3$

B. Cu metal

C. Congo red

D. Methylene blue

**Answer: D**



**View Text Solution**

**3. Choose the incorrect statement :**

A.  $AgI / I^-$  forms a negatively charged sol.

B.  $AgI / Ag^+$  forms a positively charged sol.

C.  $Fe_2O_3 \cdot xH_2O / Fe^{3+}$  forms a negatively charged sol.

D.  $Fe_2O_3 \cdot xH_2O / OH^-$  forms a negatively charged sol.

**Answer: C**



**View Text Solution**

4. Adsorption is accompanied by

A. decrease in enthalpy and decrease in entropy.

B. decrease in enthalpy and increase in entropy.

C. increase in enthalpy and increase in entropy,

D. increase in enthalpy and decrease in entropy.

**Answer: A**



**View Text Solution**

5. Delta is formed by the combination of

A. colloidal waters of river and sea.

B. electrolytic waters of river and sea.

C. colloidal river water and electrolytic sea water.

D. electrolytic river water and colloidal sea water.

**Answer: C**



**View Text Solution**

6. A solution of methylene blue is passed through animal charcoal. The filtrate obtained will appear

A. blue

B. green

C. colourless

D. red

**Answer: C**



**View Text Solution**

7. Photographic plates and films are prepared by coating an emulsion of light sensitive substance

A. potassium bromide.

B. silver fluoride.

C. silver chloride.

D. silver bromide.

**Answer: D**



**View Text Solution**

8. A phenomenon in which a substance is retained partly at the surface and partly enters the bulk is called



A. absorption

B. sorption

C. adsorption

D. desorption

**Answer: B**



**View Text Solution**

9. Ultra filtration is the process of separating colloidal particles from the solvent and soluble solutes by

A. centrifugation.

B. ultraviolet radiations.

C. specially prepared filters.

D. None of these

**Answer: C**



**View Text Solution**

**10.** Extent of adsorption of adsorbate from solution phase increases with \_\_\_\_\_

A. increase in amount of adsorbate in solution.

B. decrease in surface area of adsorbent.

C. increase in temperature of solution.

D. decrease in amount of adsorbate in solution.

**Answer: A**



**View Text Solution**

11. Physical adsorption of a gaseous species may change to chemical adsorption with

-----

- A. decrease in temperature
- B. increase in temperature
- C. increase in surface area of adsorbent
- D. decrease in surface area of adsorbent

**Answer: B**



**View Text Solution**

12. In a reaction, catalyst changes \_\_\_\_\_.

A. physically

B. qualitatively

C. chemically

D. quantitatively

**Answer: C::D**



**View Text Solution**

13. If  $x$  is the amount of adsorbate and  $m$  is the amount of adsorbent, which of the following relations is not related to adsorption process?

A.  $\frac{x}{m} = f(p)$  at constant  $T$

B.  $\frac{x}{m} = f(T)$  at constant  $p$

C.  $p = f(T)$  at constant  $(x/m)$

D.  $\frac{x}{m} = p \times T$

**Answer: D**



**View Text Solution**

**14.** Colloidal particles always carry an electric charge which of the following statements is true ?

A. All the colloidal particles carry the same charge.

B. The charge changes with the change of temperature.

C. Half the colloidal particles carry positive charge and the other half carry negative charge.

D. None of these

**Answer: A**



**View Text Solution**

**15.** Extent of physisorption of a gas increases with \_\_\_\_\_

A. increase in temperature.

B. decrease in temperature.

C. decrease in surface area of adsorbent.



D. decrease in strength of van der Waals forces.

**Answer: B**



**View Text Solution**

**16.** Which one of the following is not applicable to the phenomenon of adsorption ?

A.  $\Delta H > 0$

B.  $\Delta G < 0$

C.  $\Delta S < 0$

D.  $\Delta H < 0$

**Answer: A**



**View Text Solution**

**17.** Which of the following is an example of absorption ?

A. Water on silica gel.

B. Water on calcium chloride.

C. Hydrogen on finely divided nickel.

D. Oxygen on metal surface.

**Answer: B**



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**18.** 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**



**View Text Solution**

19. Which of the following is not a favourable condition for physical adsorption ?

A. High pressure.

B. Negative  $\Delta H$

C. Higher critical temperature of adsorbate.

D. High temperature.

**Answer: D**



**View Text Solution**

20. Which of the following colloids cannot be coagulated easily?

- A. Lyophobic colloids
- B. Irreversible colloids
- C. Reversible colloids
- D. Lyophilic colloids

**Answer: C::D**



**View Text Solution**

## Assertion Reason Questions

1. Assertion (A) :  $AgI/I^-$  is a negatively charged sol.

Reason (R) : When a dilute solution of  $AgNO_3$  is added to a dilute solution of KI, the precipitated AgI absorbs  $I^-$  ions from dispersion medium.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is

the correct explanation of the Assertion

(A).

B. Both Assertion (A) and Reason (R) are

correct statements, but Reason (R) is not

the correct explanation of the Assertion

(A)

C. Assertion (A) is correct, but Reason (R) is

incorrect statement.

D. Assertion (A) is incorrect, but Reason (R)

is correct statement



**Answer: A**



**View Text Solution**

2. Assertion (A): A low grade sulphide ore is concentrated using pine oil and frothing agent.

Reason (R) : A number of drugs are used to kill germs by getting adsorbed on them.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is

the correct explanation of the Assertion

(A).

B. Both Assertion (A) and Reason (R) are

correct statements, but Reason (R) is not

the correct explanation of the Assertion

(A)

C. Assertion (A) is correct, but Reason (R) is

incorrect statement.

D. Assertion (A) is incorrect, but Reason (R)

is correct statement

**Answer: B**



**View Text Solution**

**3. Assertion (A):** The mathematical equation of Freundlich isotherm is

$$\log \frac{x}{m} = \log k - \frac{1}{n} \log p$$

**Reason (R) :** Oxygen is adsorbed on metals by virtue of oxide formation.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is

the correct explanation of the Assertion

(A).

B. Both Assertion (A) and Reason (R) are

correct statements, but Reason (R) is not

the correct explanation of the Assertion

(A)

C. Assertion (A) is correct, but Reason (R) is

incorrect statement.

D. Assertion (A) is incorrect, but Reason (R)

is correct statement

**Answer: D**



**View Text Solution**

4. Assertion (A): A given surface of an adsorbent does not show any preference for a particular gas as van der Waal's forces are universal.

Reason (R) : The air becomes dry in the presence of silica gel because the water molecules get adsorbed on the surface of the gel.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R)

is correct statement

**Answer: B**



**View Text Solution**

5. Assertion (A) : Water vapours are adsorbed by anhydrous  $CaCl_2$  but absorbed by silica gel.

Reason (R) : The accumulation of molecular

species at the surface rather than in the bulk of solid or liquid is called adsorption.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)



C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement

**Answer: D**



**View Text Solution**

6. Assertion (A) : If manganese dioxide is added to potassium chlorate and the mixture is heated, we get  $O_2$  gas at a much lower

temperature.

Reason (R) : If a catalyst is added to the reagent, the activation energy is lowered.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not

the correct explanation of the Assertion

(A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement

**Answer: A**



**View Text Solution**

7. Assertion (A): Hydrogenation of vegetable oil in the presence of finely divided Ni produces vegetable ghee.

Reason (R) : Ammonia is produced by the reaction between  $N_2$  and  $H_2$  in the presence of Ni in Ostwald process.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement

**Answer: C**



**View Text Solution**

**8. Assertion (A):** The process of removing a dissolved substance from a colloidal solution by means of diffusion through a membrane is called dialysis.

**Reason (R) :** Tyndall effect is observed due to the fact that colloidal particles scatter light in all directions in space.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is

the correct explanation of the Assertion

(A).

B. Both Assertion (A) and Reason (R) are

correct statements, but Reason (R) is not

the correct explanation of the Assertion

(A)

C. Assertion (A) is correct, but Reason (R) is

incorrect statement.

D. Assertion (A) is incorrect, but Reason (R)

is correct statement

**Answer: B**



**View Text Solution**

9. Assertion (A) : Alum is added to muddy water to coagulate the suspended impurities and make water fit for drinking.

Reason (R) : Latex is a colloidal solution of rubber particles which are positively charged.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is



the correct explanation of the Assertion

(A).

B. Both Assertion (A) and Reason (R) are

correct statements, but Reason (R) is not

the correct explanation of the Assertion

(A)

C. Assertion (A) is correct, but Reason (R) is

incorrect statement.

D. Assertion (A) is incorrect, but Reason (R)

is correct statement

**Answer: C**



**View Text Solution**

**10. Assertion (A) :** Lyophobic sols are more stable than lyophilic sols.

**Reason (R) :** The process of settling colloidal particles is called coagulation.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is

the correct explanation of the Assertion

(A).

B. Both Assertion (A) and Reason (R) are

correct statements, but Reason (R) is not

the correct explanation of the Assertion

(A)

C. Assertion (A) is correct, but Reason (R) is

incorrect statement.

D. Assertion (A) is incorrect, but Reason (R)

is correct statement

**Answer: D**



**View Text Solution**

## Fill In The Blanks

1. Under very high vacuum of the order of \_\_\_\_\_, it is now possible to obtain ultra clean surface of the metals.



**View Text Solution**

2. A given surface of an adsorbent does not show any preference for a particular gas as \_\_\_\_\_ are universal.

 [View Text Solution](#)

3. The substance absorbed is known as \_\_\_\_\_ and the substance on which adsorption takes place is called \_\_\_\_\_

 [View Text Solution](#)

4. In physisorption the adsorbate is held to the adsorbent by weak \_\_\_\_\_ forces.

 [View Text Solution](#)

5. Aqueous solution of raw sugar when passed over beds of animal charcoal becomes \_\_\_\_\_

 [View Text Solution](#)

6. \_\_\_\_\_ are substances that enhance the activity of the catalyst.



[View Text Solution](#)

7. Easily \_\_\_\_\_ gases are readily adsorbed by the adsorbent.



[View Text Solution](#)

8. A catalyst is a substance which enhances the rate of a chemical reaction without itself getting\_\_\_\_\_ in the reaction.



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## Very Short Answer Questions

1. CO (g) and  $H_2(g)$  react to give different products in the presence of different catalysts.



Which ability of the catalyst is shown by these reactions ?



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2. Write one similarity between physisorption and chemisorptions.



[View Text Solution](#)

3. What is the effect of adding a catalyst on  
(a) activation energy  $E_a$  and (b) Gibbs energy

( $\Delta G$ ) of a reaction ?



**View Text Solution**

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



**View Text Solution**

5. Define Kraft temperature.



**View Text Solution**

6. Write the main reason for the stability of colloidal sols.

 [View Text Solution](#)

7. Out of  $BaCl_2$  and  $KCl$ , which one is more effective in causing coagulation of a negatively charged colloidal sol ? Give reasons.

 [View Text Solution](#)

8. Physisorption is reversible while chemisorption is irreversible. Why?



[View Text Solution](#)

9. A delta is formed at the meeting point of sea water and river water. Why ?



[View Text Solution](#)

10. What is type of charge on AgI colloidal sol formed when  $AgNO_3$  is added to KI solution ?

 [View Text Solution](#)

11. Write the dispersed phase and dispersion medium of paints ?

 [View Text Solution](#)

12. Of physisorption or chemisorption, which has a higher enthalpy of adsorption ?

 [View Text Solution](#)

13. Define 'peptization'.

 [View Text Solution](#)

14. Define electrophoresis.

 [View Text Solution](#)

15. Why is a finely divided substance more effective as an adsorbent ?



[View Text Solution](#)

16. Which of the following is most effective electrolyte in the coagulation of  $Fe_2O_3 \cdot H_2O / Fe^{3+}$  sol ?

$KCl, AlCl_3, MgCl_2, K_4[Fe(CN)_6]$



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**17.** What is meant by shape selective catalysis ?



**View Text Solution**

**18.** What is meant by chemisorption ?



**View Text Solution**

**19.** What is an emulsion ?



**View Text Solution**



20. Why is ferric chloride preferred over potassium chloride in the case of a cut leading to bleeding ?



[View Text Solution](#)

21. Write the dispersed phase and dispersion medium of smoke.



[View Text Solution](#)

22. Name the type of potential difference produced between the fixed charged layer and diffused layer having opposite charges around the colloidal particle.



[View Text Solution](#)

23. What is the coagulation process?



[View Text Solution](#)

24. Why is adsorption always exothermic ?



[View Text Solution](#)

**25.** Define the term Tyndall effect.



[View Text Solution](#)

**26.** Name the two types of adsorption phenomenon.



[View Text Solution](#)

27. What happens when gelatin is mixed with gold sol ?



[View Text Solution](#)

28. What are the physical states of dispersed phase and dispersion medium of froth.



[View Text Solution](#)

**29.** Why is it important to have clean surface in surface studies ?



**View Text Solution**

**30.** What is colloidion ?



**View Text Solution**

**31.** What is the term that we use when both adsorption and absorption take place ? What

is the reverse of adsorption ?

 [View Text Solution](#)

**32.** The following figure shows the variation of adsorption of  $N_2$  on charcoal with pressure at different constant temperatures.



Arrange the temperatures in increasing order.

 [View Text Solution](#)

**33.** Gelatin which is a peptide is added in ice-creams. What can be its role ?



**View Text Solution**

**34.** Why do we add alum to purify water?



**View Text Solution**

**35.** Why does bleeding stop by rubbing moist alum?



[View Text Solution](#)

**36.** What is the role of activated charcoal in gas mask used in coal mines?



[View Text Solution](#)

**37.** What is the role of adding an electrolyte in peptisation ?



[View Text Solution](#)



**38.** Of physisorption and chemisorption, which type of adsorption has a higher enthalpy of adsorption ?



**View Text Solution**

**39.** Explain the following term giving a suitable example : Emulsification.



**View Text Solution**

**40.** What happens when electric field is applied to colloidal solution ?



**View Text Solution**

**41.** Why does the white precipitate of silver halide become coloured in the presence of the dye eosin ?



**View Text Solution**

**42.** Why are some medicines more effective in the colloidal form ?



**View Text Solution**

**43.** What causes Brownian movement in colloidal solution ?



**View Text Solution**

**44.** How is Brownian movement responsible for stability of sols ?



**View Text Solution**

**45.** Name a phenomenon associated with surface chemistry.



**View Text Solution**

**46.** Name the species which concentrates at the surface.



**View Text Solution**

**47.** Name one adsorbent.



**View Text Solution**

**48.** Name the process of removing an adsorbed substance from the surface on

which it is absorbed.



[View Text Solution](#)

**49.** Both the adsorption and absorption can take place on a surface. What is the term used for this phenomenon ?



[View Text Solution](#)

**50.** Is adsorption an exothermic or endothermic phenomenon ?



[View Text Solution](#)

51. Give the name of a kind of adsorption isotherm.



[View Text Solution](#)

52. Name the catalyst used to evolve oxygen by heating potassium chlorate.



[View Text Solution](#)

53. What type of substances enhance the activity of a catalyst for the reactions ?

 [View Text Solution](#)

54. Give the name of the main product obtained when CO reacts with  $H_2$  in the presence of nickel.

 [View Text Solution](#)



**55.** Name the substance which are good shape-selective catalysts because of their honey-comb structure.



**View Text Solution**

**56.** Name the process for the manufacture of ammonia from nitrogen and hydrogen.



**View Text Solution**

57. Name a catalyst used in the manufacture of sulphuric acid by contact process.



[View Text Solution](#)

58.  $H_2S$  gas is passed through a solution of X to obtain a colloidal solution of  $As_2S_3$ . Name X.



[View Text Solution](#)

59. Name the process of removing dissolved substance from a colloidal solution by means of diffusion through a membrane.



[View Text Solution](#)

## Short Answer Questions

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



[View Text Solution](#)

2. How does an increase in temperature affect both physical as well as chemical adsorption ?



[View Text Solution](#)

3. How does the physisorption and chemisorption of a gas on a solid surface vary with pressure ? Illustrate with the help of relevant graphs.



[View Text Solution](#)

4. A colloidal solution of AgI is prepared by two different methods shown below:

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

(ii) Give reasons for the origin of charge.



[View Text Solution](#)

5. Write the dispersed phase and dispersion medium of the following colloidal systems:

(i) Smoke (ii) Milk

 [View Text Solution](#)

**6.** What are lyophilic and lyophobic colloids?

Which of these sols can be easily coagulated on the addition of small amounts of electrolytes ?

 [View Text Solution](#)

7. What is meant by coagulation of a colloidal solution ? Describe briefly any three methods by which coagulation of lyophobic sols can be carried out.



[View Text Solution](#)

8. Name the two groups into which the phenomenon of catalysis can be divided. Give an example of each group with the chemical equation involved.





[View Text Solution](#)

**9. Describe the following :**

Tyndall effect



[View Text Solution](#)

**10. Describe the following :**

Shape-selective catalysis.



[View Text Solution](#)



**11.** Label the hydrophilic and hydrophobic parts in the following molecular of non-ionic detergent :



Identify the functional groups in the molecule.



**View Text Solution**

**12.** How are the following colloids different from each other in respect of dispersion medium and dispersed phase ? Give one

example of each. (i) An aerosol (ii) A hydrosol  
(iii) An emulsion.



[View Text Solution](#)

**13.** How will you distinguish between dispersed phase and dispersion medium in an emulsion ?



[View Text Solution](#)

14. Why is  $Fe(OH)_3$  colloid positively charged when prepared by adding  $FeCl_3$  to hot water ?



[View Text Solution](#)

15. What happens when dialysis is prolonged ?



[View Text Solution](#)

**16.** Show by a graphic diagram how at a constant pressure a rise in temperature will influence adsorption of a gas on a solid when

(a) no compound formation occurs.

(b) chemisorption takes place.

 [View Text Solution](#)

**17.** How does the precipitation of colloidal smoke take place in Cottrell precipitator ?

 [View Text Solution](#)

**18.** On the basis of Hardy-Schulze rule, explain why the coagulating power of phosphate is higher than chloride.



**View Text Solution**

**19.** Why do physisorption and chemisorption behave differently with rise in temperature ?



**View Text Solution**

**20.** How does a delta form at the meeting place of sea and river water?



**View Text Solution**

**21.** What type of solutions are formed on dissolving different concentrations of soap in water ?



**View Text Solution**

22. A colloid is formed by adding  $FeCl_3$  in excess of hot water. What will happen if excess sodium chloride is added to this colloride ?



[View Text Solution](#)

23. Why does leather get hardened after tanning ?



[View Text Solution](#)

**24.** Why is chemisorption referred to as activated adsorption ?



**View Text Solution**

**25.** How does it become possible to cause artificial rain by spraying silver iodide on the clouds ?



**View Text Solution**



**26.** Give an example where physisorption changes to chemisorption with rise in temperature. Explain the reason for the change.



**View Text Solution**

**27.** How do emulsifying agents stabilise the emulsion ?



**View Text Solution**

**28.** What is the role of diffusion in heterogeneous catalysis ?



**View Text Solution**

**29.** Adsorption, if spontaneous, is exothermic.



**View Text Solution**

**30.** Explain the term dialysis with a suitable example.





[View Text Solution](#)

**31.** Why is desorption important for a substance to act as good catalyst ?



[View Text Solution](#)

**32.** What are (i) Brownian movement and (ii) Tyndall effect ? Draw diagrams to illustrate them.



[View Text Solution](#)

**33.** Taking two examples of heterogeneously catalytic reaction, explain how a heterogeneous catalyst helps in the reaction.



**View Text Solution**

**34.** A sol may be prepared by a precipitation reaction. Give one such example. How can we find the nature of electric charge on the sol particles ?



**View Text Solution**

**35.** Why do lyophilic sols not require any stabilising agent for their preservation ? How is colloidal sulphur in water prepared ?



**View Text Solution**

**36.** Describe and explain what is observed when

(i) a beam of light is passed through a colloidal solution of  $As_2S_3$ .

(ii) an electric current is passed through a colloidal solution.



[View Text Solution](#)

**37.** Show with the help of a diagram arrangement of stearate ions inside the bulk of water (ionic micelle) at critical micelle concentration of soap.



[View Text Solution](#)

**38.** What are emulsions ? How are they classified ? State an application of emulsification.



**View Text Solution**

**39.** Explain Freundlich adsorption isotherm.



**View Text Solution**

**Long Answer Questions I**

1. What happens when

a freshly prepared precipitate of  $Fe(OH)_3$  is

shaken with a small amount of  $FeCl_3$  solution

?



[View Text Solution](#)

2. What happens when

persistent dialysis of a colloidal solution is

carried out ?



[View Text Solution](#)



3. What happens when  
an emulsion is centrifuged ?

 [View Text Solution](#)

4. Write the expression for Freundlich's  
equation to describe the behaviour of  
adsorption from solution.

 [View Text Solution](#)

5. What causes charge on sol particles ?



[View Text Solution](#)

6. Name the promoter used in the Haber's process for the manufacture of ammonia.



[View Text Solution](#)

7. Write one difference in the following :

Lyophobic sol and Lyophilic sol.

 [View Text Solution](#)

8. Write one difference in the following :

Solution and Colloid.

 [View Text Solution](#)

9. Write one difference in the following :

Homogeneous catalysis and Heterogeneous catalysis.

 [View Text Solution](#)

**10.** Write one difference in the following :

Multimolecular colloid and associated colloid.



**View Text Solution**

**11.** Write one difference in the following :

Coagulation and peptisation



**View Text Solution**

**12.** Write one difference in the following :

Homogeneous catalysis and heterogeneous catalysis



**View Text Solution**

**13.** Define the following terms with an example in each :

Lyophobic colloids



**View Text Solution**

**14.** Define the following terms with an example in each :

Homogeneous catalysis



**View Text Solution**

**15.** Define the following terms with an example in each :

O/W emulsion.



**View Text Solution**

16. Differentiate between adsorption and absorption.



[View Text Solution](#)

17. Out of  $MgCl_2$  and  $AlCl_3$ , which one is more effective in causing coagulation of negatively charged sol and why?



[View Text Solution](#)

**18.** Out of sulphur sol and proteins, which one forms multimolecular colloids ?



**View Text Solution**

**19.** Define the following terms:

Lyophilic colloid



**View Text Solution**



**20.** Define the following terms:

Zeta potential



**View Text Solution**

**21.** Define the following terms:

Associated colloids.



**View Text Solution**

**22.** Define the following terms:

Sorption



**View Text Solution**

**23.** Define the following terms:

Zeta potential



**View Text Solution**

**24.** Define the following terms:

Kraft temperature.



**View Text Solution**

**25.** Give reasons for the following observations

:

Leather gets hardened after tanning.



**View Text Solution**

**26.** Give reasons for the following observations

:

Lyophilic sol is more stable than lyophobic sol.



[View Text Solution](#)

**27.** Give reasons for the following observations

:

It is necessary to remove CO when ammonia is prepared by Haber's process.



[View Text Solution](#)

**28.** Give reasons for the following observations:

A delta is formed at the meeting point of sea water and river water.



**View Text Solution**

**29.** Give reasons for the following observations:

$NH_3$  gas adsorbs more readily than  $N_2$  gas on the surface of charcoal.



[View Text Solution](#)

**30.** Give reasons for the following observations:

Powdered substances are more effective adsorbents.



[View Text Solution](#)

**31.** Write any three differences between physisorption and chemisorption.



[View Text Solution](#)

**32.** What are emulsions ? What are their different types ? Give one example of each type.



[View Text Solution](#)

**33.** In reference to Freundlich adsorption isotherm, write the expression for adsorption of gases on solids in the form of an equation.



[View Text Solution](#)

**34.** Write an important characteristic of lyophilic sols.

 [View Text Solution](#)

**35.** Based on type of particles of dispersed phase, give one example each of associated colloid and multimolecular colloid.

 [View Text Solution](#)



**36.** What are the characteristics of the following colloids ? Give one example of each.

(i) Multimolecular colloids

(ii) Lyophobic sols

(iii) Emulsions.



**View Text Solution**

**37.** Define each of the following terms :

(i) Micelles (ii) Peptization (iii) Desorption.



**View Text Solution**

**38.** Write the differences between physisorption and chemisorption with respect to the following:

(i) Specificity (ii) Temperature dependence (iii) Reversibility, and (iv) Enthalpy change.



**View Text Solution**

**39.** Explain how the phenomenon of adsorption finds application in each of the following processes :

(i) Production of vacuum (ii) Heterogeneous catalysis (iii) Froth floatation process.



[View Text Solution](#)

**40.** Explain what is observed, when an electric current is passed through a sol.



[View Text Solution](#)

**41.** Explain what is observed, when a beam of light is passed through a sol.



[View Text Solution](#)

**42.** Explain what is observed, when an electrolyte (say NaCl) is added to ferric hydroxide sol.



[View Text Solution](#)

**43.** Distinguish between multimolecular, macromolecular and associated colloids. Give one example of each.



[View Text Solution](#)

**44.** Classify colloids where the dispersion medium is water. State their characteristics and write an example of each of these classes.



[View Text Solution](#)

**45.** Explain the following terms :

Electrophoresis



[View Text Solution](#)

**46.** Explain the following terms :

Dialysis



**View Text Solution**

**47.** Explain the following terms :

Tyndall effect.



**View Text Solution**

**48.** What are promoters and poisons ?



[View Text Solution](#)

**49.** What are the different steps involved in the mechanism of catalytic activity ?



[View Text Solution](#)

**50.** What is the difference between multimolecular and macromolecular colloids ? Give one example of each type. How are

associated colloids different from these two types of colloids?



[View Text Solution](#)

**51.** How are the following colloids different from each other in respect of dispersion medium and dispersed phase ? Give one example of each type. (i) An aerosol (ii) A hydrosol (iii) An emulsion



[View Text Solution](#)



**52.** What is meant by selectivity of a catalyst ?

Explain giving examples.



**View Text Solution**

**53.** What are zeolites ? What is their utility ?



**View Text Solution**

**54.** Give reasons for the following observations :

Peptizing agent is added to convert precipitate into colloidal solution.



[View Text Solution](#)

**55.** Give reasons for the following observations

:

Cottrell's smoke precipitator is fitted at the mouth of chimney used in factories.



[View Text Solution](#)

**56.** Give reasons for the following observations

:

Colloidal gold is used for intramuscular injection.



**View Text Solution**

**57.** Explain the following observations :

Ferric hydroxide sol gets coagulated on addition of sodium chloride solution.



**View Text Solution**

**58.** Cottrell's smoke precipitator is fitted at the mouth of the chimneys used in factories.



**View Text Solution**

**59.** Explain the following observations :

Physical adsorption is multilayered, while chemisorption is monolayered.



**View Text Solution**

**60.** How does a solid catalyst enhance the rate of combination of gaseous molecules ?



**View Text Solution**

**61.** Explain what happens, when KCl, an electrolyte, is added to hydrated ferric oxide sol ?



**View Text Solution**

**62.** Explain what happens, when an electric current is passed through a colloidal solution ?



**View Text Solution**

**63.** Explain what happens, when a beam of light is passed through a colloidal solution ?



**View Text Solution**

**64.** What is enzyme catalysis ?



**View Text Solution**

**65.** Give three examples of enzyme-catalysed reactions.



**View Text Solution**

**66.** Give the sources of the enzymes, pepsin, urease and maltase.

 [View Text Solution](#)

**67.** State what is observed when :

the electrodes connected to a battery are dipped into a sol.

 [View Text Solution](#)

**68.** State what is observed when :

an electrolyte solution is added to a sol.

 [View Text Solution](#)



**69.** State what is observed when :

an emulsion is subjected to high speed centrifugation.



**View Text Solution**

**70.** Derive the mathematical expression or show the relationship between the extent of a adsorption of a gas on the surface of a solid (with lower and higher ranges of pressure).

Calculate the extent of adsorption at one atmosphere.



[View Text Solution](#)

71. In which of the following does adsorption take place and why?

(i) Silica gel placed in the atmosphere saturated with water. (ii) Anhydrous  $CaCl_2$  placed in the atmosphere saturated with water.



[View Text Solution](#)

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

 [View Text Solution](#)

73. Give an example of shape-selective catalysis.

 [View Text Solution](#)

74. Why does leather get hardened after tanning ?



[View Text Solution](#)

75. On the basis of Hardy-Schulze rule explain why the coagulating power of phosphate is higher than chloride.



[View Text Solution](#)

**76.** Do the vital functions of the body such as digestion get affected during fever ? Explain your answer.



**View Text Solution**

## Self Assessment Test Section A

**1.** Which of the following topics is not covered by surface chemistry ?

A. Electrolysis

B. Adsorption

C. Colloids

D. Enzyme catalysis

**Answer: A**



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2. Accumulation of a substance at the surface is called sorption

A. absorption

B. desorption

C. adsorption

D. none of these

**Answer: C**



**View Text Solution**

**3. In physical adsorption**

A. the extent of adsorption increases with increase in surface area.

B. enthalpy of adsorption is  $20\text{-}40\text{ kJ mol}^{-1}$

C. the process is irreversible.

D. all the above.

**Answer: D**



**View Text Solution**

**4.** An example of aerosol is

A. gem stones

B. hair cream



C. smoke

D. foam

**Answer: C**



**View Text Solution**

5. Continuous zig-zag motion of particles was studied by

A. Newton

B. Brown

C. Tyndall

D. Bredig

**Answer: B**



**View Text Solution**

**6. Assertion (A) :** Lyphobic colloids are solvent loving and are prepared by direct mixing of the dispersed phase in dispersion medium.

**Reason (R) :** Substances that enhance the activity of catalyst are called promotars.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement

D. Assertion (A) is incorrect, but Reason (R)

is correct statement.

**Answer: D**



**View Text Solution**

7. Assertion (A) : Chemisorption is highly specific and occurs only when there is a possibility of chemical bond formation.

Reason (R) : Freundlich adsorption isotherm is

given by the equation

$$\frac{x}{m} = kp^{1/n} (n > 1)$$

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is  
incorrect statement

D. Assertion (A) is incorrect, but Reason (R)  
is correct statement.

**Answer: B**



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