

N.B.Navale

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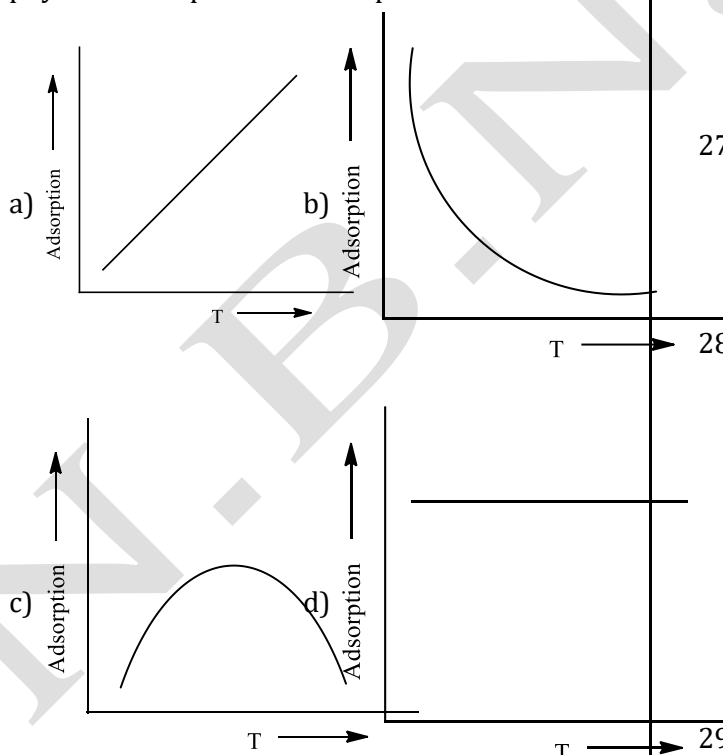
CHEMISTRY

ADSORPTION AND COLLOIDS

Single Correct Answer Type

- Physical adsorption is inversely proportional to
 - temperature
 - volume
 - concentration
 - All of the above
- Stability of an emulsion is determined by
 - toughness of the emulsifier film
 - electric charge on emulsified particles
 - Both (a) and (b)
 - None of the above
- Gas mask is prepared on the basis of adsorption because
 - it causes adsorption of poisonous gases on activated charcoal
 - it causes absorption of gaseous particles on activated charcoal
 - it increases oxygen molecule around the atmosphere by decreasing concentration of poisonous gases
 - Both (a) and (c)
- Powdered substances are more effective adsorbents than their crystalline form because
 - crystalline form has more surface area than powdered form
 - powdered form has more surface area than crystalline form
 - crystalline form adsorbs in low temperature but powdered form requires high temperature
 - None of the above
- During adsorption, which of the following has negative value?
 - ΔH
 - ΔG
 - ΔS
 - All of these
- The rate of chemisorption
 - decreases with increase of pressure
 - increases with increase of pressure
 - is independent of pressure
 - is independent of temperature
- The ability of the catalyst to direct the reaction to yield particular product is called
 - reactivity
 - selectivity
 - activity
 - fugacity
- The zeolites have shapes selectivity depending on
 - pore structure
 - atomic structure
 - molecular structure
 - None of these
- An emulsion can be diluted with H_2O (dispersion medium), then it is
 - O / W type
 - W / O type
 - Both (a) and (b)
 - None of the above
- In general, which of the following gets adsorbed readily?
 - Permanent gases
 - Easily liquefiable gases
 - All gases have same adsorbing tendency
 - None of the above
- Which of the following is multimolecular colloid?
 - Aqueous solution of protein
 - Solution of rubber in organic solvent
 - Silver solution
 - aqueous polyvinyl alcohol
- Which of the following is not a characteristic of chemisorption?
 - it is irreversible
 - it is specific
 - it is multilayer phenomenon
 - Heat of adsorption is of about - 400 kJ
- Choose the incorrect statement.
 - Physisorption is a reversible phenomenon having enthalpy of adsorption about 5 kcal mol⁻¹
 - Physisorption is multilayer phenomenon
 - Chemisorption occurs at low temperature
 - Chemisorption occurs due to chemical forces between adsorbate and adsorbent
- In physisorption, adsorbent does not show specificity for any particular gas because.....
 - it involves van der Waals' forces which behave like ideal
 - gases involved

- are universal gases
c) enthalpy of adsorption is low d) it is a reversible process
15. Enzyme activity is highest in the temperature range of
a) 0 - 15° C b) 15 - 25° C
c) 25 - 45° C d) remain same in all
16. Surface of the eye is protected from bacterial infection by the enzyme
a) carbonic anhydrate b) urease
c) lysozyme d) zymase
17. Which of the following catalyst catalyses the conversion of glucose into ethanol?
a) Zymase b) Invertase
c) Maltase d) Diastase
18. Physisorption is exothermic in nature because
a) $\Delta H < 0$ b) $\Delta H > 0$
c) $\Delta H = 0$ d) None of the above
19. Extent of adsorption is
a) temperature dependent b) pressure dependent
c) surface area dependent d) All of the above
20. Which of the following is the variation of physical adsorption with temperature?



21. Adsorption of gaseous molecules of hydrogen on Pd is known as
a) reduction b) occlusion
c) hydration d) hydrogenation
22. Which of the following catalyst is used during

the hydrogenation of oil?

- a) Fe b) Ni
c) Pt d) Mo
23. Some of the important characteristics of emulsion are as :
(i) Particle size is the ranges from 1000 Å to 10,000 Å.
(ii) It shows Brownian motion.
(iii) It exhibit Tyndall effect.
Point out the correct statement .
a) (i) and (ii) b) (ii) and (iii)
c) (i) and (iii) d) All of these
24. Which of the following is the correct approximate value of ratio of size of colloidal particle to suspension?
a) Equal to 1.5 b) Less than 1
c) Zero d) 10 Å
25. The simplest way to check whether a system is colloidal is
a) electrodialysis b) finding out particle size
c) Tyndall effect d) Brownian movement
26. The role of the activated charcoal in gas mask used coal mine is
a) adsorption of poisonous gases b) adsorption of poisonous gases
c) neutralization of gases d) None of the above
27. In physisorption, the molecules of adsorbate held to the adsorbent by
a) chemical forces b) ionic forces
c) van der Waals' forces d) None of the above forces
28. In general, H_2 gas is adsorbed on activated charcoal to a less extent in comparison to the easily liquefiable gases due to
a) very strong van der Waals' force and low critical temperature b) very weak van der Waals' force and low critical temperature
c) very strong van der Waals' force and high critical temperature d) very weak van der Waals' force and high critical temperature
29. Point out the correct statement.
a) During adsorption, both enthalpy and entropy are more than zero b) During adsorption, both enthalpy and entropy are less than zero
c) During adsorption, enthalpy is -ve and entropy is +ve d) None of the above

- quantity
30. Catalyst increases the rate
a) by decreasing E_a b) by increasing E_a
c) by increasing entropy d) by both (a) and (c)
31. Identify the gas which is readily adsorbed by activated charcoal.
a) H_2 b) N_2
c) SO_2 d) O_2
32. Which of the following (s) is/are W/O type emulsion?
a) Cold cream b) Butter
c) Both (a) and (b) d) None of the above
33. Which of the following is incorrect about adsorption?
a) it increases humidity of atmosphere b) it decreases humidity of atmosphere
c) it is pressure dependent d) it is temperature dependent
34. Ink is adsorbed on the chalk. In this ink and chalk are respectively
a) adsorbate and adsorbent b) adsorbent and adsorbate
c) Both adsorbent d) both adsorbate
35. Select the correct statement (s).
a) Milk is a type of emulsion b) Brownian motion is observed in emulsion

- c) Cleaning action of soap is due to formation of emulsions (Micelle) d) All of the above are correct statements
36. Adsorption is the phenomenon in which a substance
a) accumulates on the surface of the other substance b) goes into the body of the other substance
c) remains close to the other substance d) None of the above
37. There are certain properties related to adsorption
I. reversible
II. formation of unimolecular layer
III. low heat of adsorption
IV. occurs at low temperature and decreases with increasing temperature
Which of the above properties are for physical adsorption?
a) I, II and III b) I, III and IV
c) II, III and IV d) II, IV and III
38. For the conversion of oxygen to ozone in the atmosphere, nitric oxide in gaseous phase acts as
a) enzyme catalyst b) inhibitor
c) homogeneous catalyst d) heterogeneous catalyst

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: ANSWER KEY :

1)	a	2)	c	3)	d	4)	b
5)	d	6)	b	7)	b	8)	a
9)	a	10)	b	11)	c	12)	c
13)	c	14)	a	15)	b	16)	c
17)	a	18)	a	19)	d	20)	b
21)	b	22)	b	23)	d	24)	b
25)	c	26)	b	27)	c	28)	b
29)	b	30)	a	31)	c	32)	c
33)	a	34)	a	35)	d	36)	a
37)	b	38)	c				

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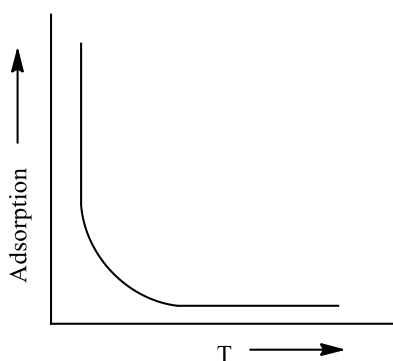
ADSORPTION AND COLLOIDS

: HINTS AND SOLUTIONS :

Single Correct Answer Type

- | | |
|--|---|
| <p>1 (a)
Physical adsorption is inversely proportional to temperature.</p> <p>2 (c)
Stability of an emulsion is determined by the toughness of the emulsifier film and by the electric charge on emulsified particles.</p> <p>3 (d)
Poisonous gases get adsorbed by activated charcoal hence, concentration of poisonous gases around atmosphere decreases and concentration of oxygen increases.</p> <p>4 (b)
Powdered form has more surface area than crystalline form. And as surface area increases, extent of adsorption also increases.</p> <p>5 (d)
For spontaneous adsorption,
 $\Delta H = -ve,$ $\Delta G = -ve$ and $\Delta S = -ve$</p> <p>6 (b)
The rate of chemisorption increases with increase of pressure.</p> <p>7 (b)
The ability of the catalyst is to direct the reaction to yield particular product is called selectivity.</p> <p>8 (a)
The zeolites have shape selectivity depending on pore structure.</p> <p>9 (a)
An emulsion can be diluted with H₂O then it is</p> | <p>O/W type.</p> <p>10 (b)
Because easily liquefiable gases have high value of critical temperature.</p> <p>11 (c)
Silver solution is an example of multimolecular colloid. In this type of colloid, a large number of atoms or small molecules (having diameters of less than 1 nm) of a substance combine together in a dispersion medium to form aggregates having size in the colloidal range.</p> <p>12 (c)
Chemisorption is irreversible, specific, heat of adsorption is of about - 400 kJ.</p> <p>13 (c)
Chemisorption occurs due to chemical bond between adsorbate and adsorbent which occurs at high temperature.</p> <p>14 (a)
Van der Waals' forces are identical for all gases.</p> <p>15 (b)
Enzyme activity is highest in the temperature range of 15-25° C.</p> <p>16 (c)
Lysozyme is the enzyme that protects the eye from bacterial infection.</p> <p>17 (a)
Zymase catalyst catalyses the conversion of glucose into ethanol.</p> <p>18 (a)
If ΔH is negative, process is exothermic.</p> <p>19 (d)
Extent of adsorption is dependent on temperature, pressure and surface area.</p> |
|--|---|

- 20 **(b)**
The variation of physical adsorption with temperature is



- 21 **(b)**
Occlusion is a property to accumulate gas on solid surface.
- 22 **(b)**
Ni (Nickel) is used during the hydrogenation of oil.
- 23 **(d)**
All the statements are correct.
- 24 **(b)**

$$\frac{\text{Size of colloidal particle}}{\text{Size of suspension particle}} = 10^{-10} - 10^{-3} \frac{\text{\AA}}{\text{\AA}} =$$

$$< 1 \qquad \qquad \qquad > 10^3 \text{\AA}$$
- 25 **(c)**
The simplest way to check whether a system is colloidal is to pass a beam of light through the colloidal solution the path becomes visible as a bright streak. This is known as Tyndall effect.
- 26 **(b)**
Activated charcoal is used for the adsorption of poisonous gases on its surface.
- 27 **(c)**
Weak van der Waals' forces are responsible for physisorption.
- 28 **(b)**
 H_2 is a permanent gas hence, has low value of critical temperature and low van der Waals' force, due to these factors, it shows low extent of

adsorption.

- 29 **(b)**
For adsorption, $\Delta H < 0$, $\Delta S < 0$.
- 30 **(a)**
Catalyst increases the rate by decreasing E_a .
- 31 **(c)**
Easily liquefiable gases like SO_2 , NH_3 have greater value of critical temperature than elemental gases, i.e. N_2 , O_2 , H_2 , thus readily get adsorbed.
- 32 **(c)**
Cold cream and butter are W/O type emulsions.
- 33 **(a)**
Adsorption of water decreases amount of water particles hence, humidity also decreases.
- 34 **(a)**
Ink is adsorbed on the chalk. In this, ink and chalk are adsorbate and adsorbent respectively.
- 36 **(a)**
Adsorption is the phenomenon in which a substance accumulates on the surface of the other substance.
- 37 **(b)**
Physical adsorption is reversible, have low heat of adsorption and occurs at low temperature. It decreases with increasing temperature. It forms the multimolecular layer.
- 38 **(c)**
For the conversion of oxygen to ozone in the atmosphere, nitric oxide in gaseous phase acts as a homogeneous catalyst. This is because, both reactant and the catalyst are in the same phase (i.e. gas).