

B-4.	A catalyst in a reaction : (1) increases the activation energy of the forward reaction. (2) increases the activation energy of the backward reaction. (3) increases the activation energy of both the reactions. (4*) decreases the activation energy of both the reactions.							
B-5.	A catalyst in a reaction changes (1) Equilibrium constant (3*) Rate constant	llowing? (2) Entropy (4) Nature of products.						
B-6.	Consider the following reactions (i) $2SO_2 + O_2 \longrightarrow 2SO_3$ (iii) $N_2 + O_2 \longrightarrow 2NO$ The reactions which require a ca (1) (i) and (iii) (2) (ii) a	; atalyst are : nd (iv)	(ii) N <sub>2</sub> + 3ł (iv) H <sub>2</sub> + l <sub>2</sub> (3*) (i) and	H2 2NH 2 2NH 2 2HI d (ii)	₃ (4) all of the	ese		
B-7.	A biological catalyst is essentiall (1*) an enzyme (2) a ca	y : rbohydrate	(3) an am	ino acid	(4) a nitrog	eneous base		
Sectio	on (C) : Classification, Prepa	aration & Puri	fication o	f Colloid				
C-1.	An example of intrinsic colloid (I) (1) $As_2S_3$ sol (2) $Fe(C)$	yophilic colloids) DH)₃ sol	is : (3*) Egg a	Ilbumin	(4) Au sol			
C-2.	<ul><li>Which of the following sols is neg (1*) Arsenious sulphide</li><li>(3) Ferric hydroxide</li></ul>	gatively charged	l? (2) Alumir (4) Silver	nium hydroxide iodide in silver	e nitrate solu	ition		
C-3. C-4.	<ul> <li>Peptisation is:</li> <li>(1) conversion of a colloidal into precipitate form</li> <li>(2*) conversion of precipitate into colloidal sol</li> <li>(3) conversion of metal into colloidal sol by passage of electric current</li> <li>(4) conversion of colloidal sol into macromolecules</li> <li>Bleeding is stopped by the application of ferric chloride. This is because:</li> <li>(1) the blood starts flowing in opposite direction</li> <li>(2) the blood reacts and forms a solid, which seals the blood vessel</li> </ul>							
C-5.	<ul><li>(4) the ferric chloride seals the b</li><li>Which of the following is a hydro</li><li>(1) Barium sulphate sol</li><li>(3*) Starch sol</li></ul>	lood vessel. philic colloidal s	ol ? (2) Arseni (4) Silver	ous sulphide s iodide sol	ol			
C-6.	Cloud is an example of : (1) solid dispersed in gas (3) liquid dispersed in solid		(2*) liquid (4) solid d	dispersed in g ispersed in liq	jas uid			
C-7.	Which one among the following a (1) Gum	sols is hydropho (2) Gelatin	bic ? (3	3) Starch	(4*	) Sulphur		
C-8.	Colloidal gold is prepared by : (1) mechanical dispersion (3*) Bredig's arc method		(2) peptisa (4) hydrol <u>y</u>	ation ysis				
C-9.	Tyndall effect is observed in : (1) solution (2) prec	ipitate	(3*) sol		(4) vapour			
C-10.	Lyophillic colloids are stable due (1) charge on the particle (3) small size of the particle	e to :	(2) large s (4*) layer	ize of the part of dispersion r	icle nedium on t	the particles		

Peptization is a process of :

C-11.

(2) purification of colloids. (1) precipitation of colloidal particles. (3\*) dispersing precipitate into colloidal sols. (4) movement of colloidal particles in the electrical field. Section (D): Coagulation, Protection & Application of colloid D-1. Gold number of a lyophilic sol is such property that: (1) the larger its value, the greater is the peptising power (2) the lower its value, the greater is the peptising power (3\*) the lower its value, the greater is the protecting power (4) the larger its value, the greater is the protecting power D-2. Protective sols are : (1\*) lyophilic (2) lyophobic (3) both (1) and (2) (4) none of (1) and (2) Which of the following ions is most effective in the coagulation of an arsenious sulphide solution ? D-3. (1) K<sup>+</sup> (2) Mg<sup>2+</sup> (3\*) Al3+ (4) C Which of the following ions is most effective in the coagulation of ferric hydroxide solution ? D-4. (1) Cl<sup>-</sup> (2) Br-(3) NO2<sup>-</sup> (4\*) SO42-D-5. Gold number gives : (1) the amount of gold present in the colloid. (2) the amount of gold required to break the colloid. (3) the amount of gold required to product the colloid. (4\*) none of the above. D-6. Gelatin is mostly used in making ice cream in order to : (1) prevent making of a colloid. (2\*) stabilize the colloid and prevent crystallization. (3) stabilize the mixture. (4) enrich the aroma. D-7. Which one of the following will have the highest coagulation power for a ferric hydroxide sol ? (3) K<sub>2</sub>CrO<sub>4</sub> (1) NaCl (2) BaCl<sub>2</sub> (4\*) K<sub>3</sub>[Fe(CN)<sub>6</sub>] Section (E) : Emulsion, Micelle & Gel E-1. Small liquid droplets dispersd in another liquid is called : (1) Suspension (2\*) Emulsion (3) Gel (4) True solution E-2. At CMC, the surfactant molecules : (1) Decomposes (2) Become completely soluble (3\*) Associate (4) Dissociate E-3. Some type of gels like gelatin loose water slowly. The process is known as : (3) peptisation (1\*) synerisis (2) thixotropy (4) imbibition E-4. In which one of the following properties emulsions differ from colloidal sols ? (2) Brownian movement (1) Tyndall effect (3) Electrophoresis (4\*) Size of the particles of the dispersed phase E-5. Cod liver oil is : (1) fat dispersed in water (2) water dispersed in fat (3\*) water dispersed in oil (4) fat dispersed in oil Exercise-2

### **PART - I : OBJECTIVE QUESTIONS**

Soaking of water by a sponge is an example of :

 (1) simple adsorption
 (2) physical adsorption
 (3) chemisoption

(4\*) absorption

2.	Which is not a purely su (1) Surface tension.	urface phenomena ? (2) Adsorption.	(3*) Absorption.	(4) None of these.
3.	Which one is not the ch (1*) Multilayer adsorption (3) Strong adsorption by	aracteristic of chemisorp on y adsorption sites	tion ? (2) Exothermic nature (4) Irreversible	9
4.	Size of colloidal particle (1*) 1 to 1000 nm	es may range from (2) 10 to 100 pm	(3) 1 to 100 μm	m (4) 1 to 10 mm
5.	Coagulation value of th many times AICl₃ has g (1) 930	ne electrolytes AlCl₃ and reater coagulating power (2) 520	NaCl for As₂S₃ sol are than NaCl. (3*) 560	e 0.093 and 52 repectively. How (4) None of these
6.	Graph between log x/m and ln k = 0.693, the an $(1^*)$ 1	and log p is a straight lin nount of solute adsorbed (2) 1.5	ne inclined at an angle c per gram of adsorbent (3) 0.25	of 45º. When pressure is 0.5 atm will be (4) 2.5
7.	<ul> <li>Which of the following s</li> <li>(1) It is not easily solvat</li> <li>(2) It is unstable</li> <li>(3) The coagulation of t</li> <li>(4*) It is quite stable in a</li> </ul>	statements is correct for a ted his sol is irreversible in n a solvent	a lyophilic solution ? ature	
8.	Liquid-liquid sol is know (1) aerosol	/n as (2) foam	(3*) emulsion	(4) gel
9.	The colloidal system co (1) aerosol	nsisting of a liquid adsor (2) foam	bate in a solid adsorben (3) emulsion	nt is termed as (4*) gel
10.	Which of the following s (1) A colloidal solution (2*) Silver sol in water is (3) Metal hydroxides in (4) Liquid-liquid colloida	statements is not correct is a heterogeneous two- s an example of lyophilic water are examples of ly al solution is not a stable	? phase system solution. ophobic solution system	
11.	Which of the following r (1) Starch	epresents a multimolecu (2*) A sol of gold	lar colloidal particles? (3) Proteins	(4) Soaps
12.	Which of the following a (1) Cl <sup>−</sup>	anions will have minimum (2) Br⁻	n flocculation value for th (3) SO₄²-	he ferric oxide solution ? (4*) [Fe(CN)₀l³-
13.	Which of the following r (1) Solution of gold	epresents a macromolec (2*) Cellulose	cular colloidal particles ? (3) Soaps	? (4) Synthetic detergents
14.	Which of the following s (1) Peptization is the pro- sols of gold, silver and p (3*) Impurities present i (4) Dialysis is a process	statements is not correct? ocess by which certain supplatinum can be prepared n a solution makes it mo s to remove impurities of	? ubstances are converted d by Bredig's arc method re stable ions and molecules fron	d into the colloidal state (2) Meta d. m a solution.
15.	Select correct statemen (1) hydrophilic colloid is water (2) hydrophobic colloid phase and water (3) hydrophobic sols are or a supersaturated (4*) all of the above	nt (s): a colloid in which there is a colloid in which there e often formed when a so solution	is a strong attraction be e is a lack of attraction b blid crystallises rapidly fr	etween the dispersed phase and between the dispersed rom a chemical reaction

**Exercise-3** 



5

# PART - I : JEE (MAIN) / AIEEE PROBLEMS (PREVIOUS YEARS)

### **OFFLINE JEE-MAIN**

1.	Which one of the followin (1) Adsorption on solids (3) Adsorption is sponta	ng characteristics is not is reversible (2*) Ad neous (4) Bot	correct for physical adso lsorption increases with in h enthalpy and entropy o	orption? <b>[AIEEE 2003, 3/225</b> increase in temperature of adsorption are negative.	]		
2.	The disperse phase in correspectively. Which of the (1) Coagulation in both so (2*) Mixing the sols has (3) Sodium sulphate sole (4) Magnesium chloride	olloidal iron (III) hydroxid ne following statements sols can be brought abo no effect ution causes coagulatio solution coagulates, the	de and colloidal gold is po is NOT correct? but by electrophoresis n in both sols e gold sol more readily th	ositively and negatively charge [AIEEE 2005, 3/225] han the iron (III) hydroxide sol.	d,		
3.	The volume of collodial could be : (1) ~ 1	particle V <sub>c</sub> as compare (2) ~ $10^{23}$	d to the volume of a solu (3) ~ 10 <sup>-3</sup>	ute particle in a true solution ( [AIEEE 2005, 3/225] (4*) ~ 10 <sup>3</sup>	Vs ]		
4.	In langmuir's model of a (1) the rate of dissociat covered (2) the adsorption at a si (3*) the mass of gas strik (4) the mass of gas strik	dsorption of a gas on a ion of adsorbed molec ingle site on the surface king a given area of sur ing a given area of surfa	solid surface : ules from the surface do may involve multiple mo face is proportional to the ace is independent of the	[AIEEE 2006, 3/165] oes not depend on the surface plecules at the same time e pressure of the gas e pressure of the gas	] ce		
5.	Gold numbers of protect correct order of their pro	ctive colloids A, B, C an tective powers is	nd D are 0.50, 0.01, 0.1	10 and 0.005, respectively. Th [AIEEE 2008, 3/105]	пе ]		
6.	<ul> <li>Which of the following statements is incorrect regarding physiosorptions ? [AIEEE 2009, 4/144]</li> <li>(1) More easily liquefiable gases are adsorbed readily.</li> <li>(2) Under high pressure it results into multi molecular layer on adsorbent surface.</li> <li>(3*) Enthalpy of adsorption (ΔH<sub>adsorption</sub>) is low and positive.</li> <li>(4) It occurs because of van der Waal's forces.</li> </ul>						
7.	According to Freundlich	adsorption isotherm wh	ich of the following is cor	rrect? [AIEEE 2012, 4/120]	]		
	(1) $\frac{\pi}{m} \propto p^0$ (3) $\propto p^{1/n}$	(2) m (4*) Al	imes p <sup>1</sup> Il the above are correct fo	or different ranges of pressure	!		
8.	The coagulating power of in the order : (1) Al <sup>3+</sup> < Ba <sup>2+</sup> <na<sup>+</na<sup>	of electrolytes having io (2*) Na+ < Ba <sup>2+</sup> < Al <sup>3+</sup>	ns Na+, Al <sup>3+</sup> and Ba <sup>2+</sup> for (3) Ba <sup>2+</sup> < Na <sup>+</sup> < Al <sup>3+</sup>	r arsenic sulphide sol increase [JEE(Mains) 2013, 4/120] (4) Al <sup>3+</sup> < Na <sup>+</sup> < Ba <sup>2+</sup>	es		
9.	3 gram of activated charocoal was added to 50 mL of acetic acid solution (0.06N) in a flask. After an hour it was filtered and the strength of the fitrate was found to be 0.042 N. The amount of acetic acid adsorbed (per gram of charcoal) is : [JEE(Main)-2015, 4/120]						
10.	For a linear plot of log( statements is correct? (k (1) 1/n appears as the in (3) log (1/n) appears as	x/m) versus log p in a and n are constants) ntercept the intercept.	Freundlich adsorption is (2*) Only 1/n appears a (4) Both k and 1/n appe	sotherm, which of the followir [JEE(Main)-2016, 4/120] as the slope. ear in the slope term.	٦g		
11.	The Tyndall effect is obs (a) The diameter of the o	served only when follow dispersed particles is m	ing conditions are satisfie uch smaller than the wav	ed : <b>[JEE(Main)-2017, 4/120]</b> /elength of the light used.			

(b) The diameter of the dispersed particles is not much smaller than the wavelength of the light used

- (c) The refractive indices of the dispersed phase and dispersion medium are almost similar in magnitude.
- (d) The refractive indices of the dispersed phase and dispersion medium differ greatly in magnitude.
- (1\*) (b) and (d) (2) (a) and (c) (3) (b) and (c) (4) (a) and (d)

### **ONLINE JEE-MAIN**

- The following statements relate to the adsorption of gases on a solid surface. Identify the incorrect 1. statement among them : [JEE(Main) 2015 Online (10-04-15), 4/120]
  - (1) On adsorption decrease in surface energy appears as heat
  - (2) Enthalpy of adsorption is negative
  - (3\*) On adsorption, the residual forces on the surface are increased
  - (4) Entropy of adsorption is negative
- 2. Under ambient conditions, which among the following surfactants will form micelles in aqueous solution at lowest molar concentration? [JEE(Main) 2015 Online (11-04-15), 4/120]

(2) CH<sub>3</sub>(CH<sub>2</sub>)<sub>11</sub>  $\overset{\widetilde{N}}{N}$  (CH<sub>3</sub>)<sub>3</sub>Br<sub>-</sub> (1) CH<sub>3</sub>-(CH<sub>2</sub>)<sub>8</sub> -COO- Na+ (4\*) CH<sub>3</sub>(CH<sub>2</sub>)<sub>15</sub> <sup>⊕</sup> (CH<sub>3</sub>)<sub>3</sub>Br<sub>-</sub> (3) CH<sub>3</sub>-(CH<sub>2</sub>)<sub>13</sub>-OSO<sub>3-</sub> Na+

- The most appropriate method of making egg-albumin sol is:[JEE(Main) 2016 Online (09-04-16), 4/120] 3. (1) Keep the egg in boiling water for 10 minutes. After removing the shell, transfer the vellow part of the content to 100 mL of 5% w/V saline solution and homogenize with a mechanical shaker.
  - (2\*) Break an egg carefully and transfer the transparent part of the content to 100 mL of 5% w/V saline solution and stir well.
  - (3) Keep the egg in boiling water for 10 minutes. After removing the shell, transfer the white part of the content to 100 mL of 5% w/V saline solution and homogenize with a mechanical shaker.
  - (4) Break an egg carefully and transfer only the yellow part of the content to 100 mL of 5% w/V saline solution and stir well.
- 4. A particular adsorption process has the following characteristics: (i) It arises due to vander Waals forces and (ii) it is reversible. Identify the correct statement that describes the above adsorption process: [JEE(Main) 2016 Online (09-04-16), 4/120]
  - (1) Enthalpy of adsorption is greater than  $100 \text{ kJ mol}^{-1}$ .
  - (2) Adsorption is monolaver.
  - (3) Adsorption increases with increase in temperature.
  - (4\*) Energy of activation is low.
- Gold numbers of some colloids are : Gelatin : 0.005 0.01, Gum Arabic : 0.15 0.25 ; Oleate : 0.04 1.0; 5. Starch: 15 - 25. Which among these is a better protective colloid ?
  - (1\*) Gelatin (2) Starch
- [JEE(Main) 2016 Online (10-04-16), 4/120]

(3) Gum Arabic (4) Oleate

- Among the following, **correct** statement is : 6.
  - [JEE(Main) 2017 Online (08-04-17), 4/120] (1) One would expect charcoal to adsorb chlorine more than hydrogen sulphide
  - (2) Sols metal sulphides are lyophilic
  - (3) Hardy Schulze law states that bigger the size of the ions, the greater is its coagulating power.
  - (4\*) Brownian movement is more pronounced for smaller particles than for bigger-particles.
- Adsorption of a gas on a surface follows Freundlich adsorption isotherm. Plot of log <sup>m</sup> versus log p gives 7. a straight line with slope equal to 0.5, then : [JEE(Main) 2017 Online (09-04-17), 4/120]
  - Х

( m is the mass of the gas adsorbed per gram of adsorbent)

- (1) Adsorption is proportional to the pressure.
- (2\*) Adsorption is proportional to the square root of pressure.
- (3) Adsorption is proportional to the square of pressure.

(4) Adsorption is independent of pressure.

### PART - II : JEE (ADVANCED) / IIT-JEE PROBLEMS (PREVIOUS YEARS)

#### \* Marked Questions may have more than one correct option.



- 6. Methylene blue, from its aqueous solution, is adsorbed on activated charcoal at 25° C. For this process, the correct statement is [JEE(Advanced)-2013, 2/120]
  - (A) The adsorption requires activation at 25°C.
  - (B\*) The adsorption is accompanied by a decreases in enthalpy.
  - (C) The adsorption increases with increase of temperature.
  - (D) The adsorption is irreversible.

8.

7. The qualitative sketches I, II and III given below show the variation of surface tension with molar concentration of three different aqueous solution of KCl, CH<sub>3</sub>OH and CH<sub>3</sub>(CH<sub>2</sub>)<sub>11</sub> OSO<sub>3</sub>- Na<sup>+</sup> at room temperature. The correct assignment of the sketches is : [JEE(Advanced)-2016, 3/124]



(A) The critical temperatures of ethane and nitrogen are 563 K and 126 K, respectively. The adsorption of ethane will be more than that of nitrogen of same amount of activated charcoal at a given temperature.

- (B) Cloud is an emulsion type of colloid in which liquid is dispersed phase and gas is dispersion medium.
- (C) Adsorption is accompanied by decrease in enthalpy and decrease in entropy of the system.

(D) Brownian motion of colloidal particles does not depend on the size of the particles but depends on viscosity of the solution.

### Additional Problems For Self Practice (APSP)

## **PART - I : PRACTICE TEST PAPER**

### JEE(Main) Pattern Practice paper (30 SCQ, 1 hr, 120 Marks).

Marked Questions may have for Revision Questions.

This Section is not meant for classroom discussion. It is being given to promote self-study and self testing amongst the Resonance students.

Max. Marks : 120 Max. Time : 1 Hr.

#### Important Instructions

- 1. The test is of 1 hour duration.
- 2. The Test Booklet consists of 30 questions. The maximum marks are 120.
- 3. Each question is allotted 4 (four) marks for correct response.
- 4. Candidates will be awarded marks as stated above in Instructions No. 3 for correct response of each question.

<sup>1</sup>/<sub>4</sub> (one fourth) marks will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.

5. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instructions 4 above.

1.	[n being a whole number]					
	(1) K	(2) log K	(3) n	(4*) 1/n		
2.	Surface tension of lyoph (1*) Lower than that of H (3) Equal to that of H <sub>2</sub> O	nilic sols is : H₂O	<ul><li>(2) More than that of H<sub>2</sub>O</li><li>(4) None of the above</li></ul>			
3.	On passing light from co (1) Electrophrosis	ollidal solution, the effect (2*) Tyndall effect	due to scattering of light is known as : (3) Electromosis (4) Coagulation			
4.	Tyndall effect is shown (1*) Sol	by : (2) Solution	(3) Plasma	(4) Precipitation		
5.	Milk is an example of : (1) True solution	(2) Gel	(3) Suspension	(4*) Emulsion		
6.	Most effective ion to coa (1) $PO_4^{3-}$	agulate a negative sol is (2*) Al <sup>3+</sup>	: (3) Ba²+	(4) K+		
7.	Which of the following e (1) NaNO <sub>3</sub>	electrolytes will be most e (2) K4[Fe(CN)6]	effective in the coagulation (3) Na <sub>3</sub> PO <sub>4</sub>	n of gold sol : (4*) MgCl₂		
8.	The stability of lyophilic (1) Charge on their part (3) Small size of their part	colloid is due to which of icles articles	f the following : (2) Large size of their particles (4*) Solvation by dispersion medium			
9.	A colloidal solution is su of the same solution is s (1) NaCl > BaCl <sub>2</sub> > AlCl ( $3^*$ ) AlCl <sub>3</sub> > BaCl <sub>2</sub> > NaCl	bjected to an electrical fi studied using NaCl, BaCl 3 Cl	field. The particles move towards anode. The coagulation Cl <sub>2</sub> and AlCl <sub>3</sub> solutions. Their coagulating power should be (2) BaCl <sub>2</sub> > AlCl <sub>3</sub> > NaCl (4) BaCl <sub>2</sub> > NaCl > AlCl <sub>3</sub>			
10. 11	Which of the following is (1) KCI	s most effective in coagu (2) KNO2 Moidal system of :	lating a ferric hydroxide s (3) K <sub>2</sub> SO <sub>4</sub>	sol : (4*) K₃[Fe(CN)₅]		
	(1*) Liquid dispersed in	gas	(2) Gas dispersed in gas			

	(3) Solid dispersed in gas		(4) Solid dispersed in liquid		
12.	The charge on $As_2S_3$ sol is (1) H <sup>+</sup> (2)	due to the adsorbed OH⁻	: (3) O <sup>-2</sup>	(4*) S <sup>-2</sup>	
13.	The sky looks blue due to : (1) Dispersion (2)	Reflection	(3) Transmission	(4*) Scattering	
14.	Tyndall effect will be observ (1) Solution (2)	ed in : Percipitate	(3*) Sol	(4) Vapour	
15.	The Brownian motion is due (1) Temperature fluctuation (2) Attraction and repulsion (3*) Impact of molecules of (4) Convective current	to : within the liquid pha between charge on the dispersion mediu	se the colloidal particles um on the colloidal partic	les	
16.	In coagulating the colloidal (1) NaCl	solution of As₂S₃ whi (2) KCl	ch has the minimum coa (3) BaCl <sub>2</sub>	igulating value : (4*) AlCl₃	
17.	Positive sol is : (1) Gold	(2*) Gelatin	(3) As <sub>2</sub> S <sub>3</sub>	(4) None	
18.	Which one is a lyophobic co(1) Gelatin(2)	lloid : Starch	(3*) Sulphur	(4) Gum arabic	
19.	Smoke is an example of : (1) Gas dispersed in liquid (3*) Solid dispersed in gas		(2) Gas dispersed in so (4) Solid dispersed in so	lid olid	
20.	A colloidal solution of arsen	ous sulphide is mos	t readily coagulated by th	ne addition of a normal solution?	
21.	A colloid always : (1*) Contains two phases (3) Contains three phases		<ul><li>(2) Is a true solution</li><li>(4) Contains only water</li></ul>	soluble particles	
22.	Which of the following ions (1) $[Fe(CN)_6)]^{4-}$ (2*	nas maximum floccu ⊨Cl <sup>_</sup>	llation value : (3) SO <sup>2–</sup> 4	(4) PO <sup>-3</sup> 4	
23.	Which of the following gase (1*) CO <sub>2</sub>	s, will be adsorbed r (2) O <sub>2</sub>	naximum on a solid surfa (3) N₂	ace : (4) H <sub>2</sub>	
24.	Which of the following is a r (1) Lyophilic colloids – (2) Associated colloids – (3) Tyndall effect (4*) Electrophoresis –	nismatch : reversible sols micelles – scatter movement of d	ing of light by colloidal pa ispersion medium under	article the influence of electric field	
25.	A negative catalyst will (1*) raise the energy of activ (2) take away the internal et (3) catalyse the backward re (4) none of these	vation for a given rea nergy of reactants a eaction more than th	action nd deactivate them e forward one, thereby s	hifting equilibrium backward.	
26.	A liquid is found to scatter a The liquid can be described (1) a suspension (2)	a beam of light but l as Oil	eaves no residue when   (3*) a colloidal sol	passed through the filter paper. [AIIMS 1993] (4) a true solution	
27.	Which of the following kinds (1*) heterogeneous catalysi (3) homogeneous catalysis	of catalysis can be s	explained by the adsorpt (2) enzyme catalysis (4) acid base catalysis	tion theory? [AIIMS 1995]	
28.	Which of the following relati (i) $x/m = constant$ (ii) $x/m = constant \times p^{1/n}$ (n = (iii) $x/m = constant \times p^n$ (n >	ons is (are) correct a • 1) 1)	according to Freundlich ?	2 [AIIMS 1995]	

### **Surface Chemistry**

(1) All are correct (2) All are wrong

(3\*) (ii) is correct

(4) (iii) is correct

- 29. The physical adsorption of gases on the solid surface is due to
   (1\*) vander Waals forces
   (2) covalent bonding
   (3) hydrogen bonding
- **30.** Correct equation of Freundlich isotherm is :

$$(1^*) \log^{\left(\frac{X}{m}\right)} = \log K + \frac{1}{n} \log C$$

$$(3) \log^{\left(\frac{X}{m}\right)} = \log C + \frac{1}{K} \log C$$

(2) 
$$\log^{\left(\frac{x}{n}\right)} = \log m + \frac{1}{m} \log C$$
  
(4)  $\log^{\left(\frac{x}{m}\right)} = \log C + \frac{1}{n} \log K$ 

#### Practice Test (IIT-JEE (Main Pattern)) OBJECTIVE RESPONSE SHEET (ORS)

Que.	1	2	3	4	5	6	7	8	9	10
Ans.										
Que.	11	12	13	14	15	16	17	18	19	20
Ans.										
Que.	21	22	23	24	25	26	27	28	29	30
Ans.										

### **PART - II : PRACTICE QUESTIONS**

### Practice Questions: 20-50 depending on chapter length.

**1.** Following is the variation of physical adsorption with temperature:



- **4.** Purifications of blood in the body is based upon the phenomenon of : (1) electrophoresis (2) electro-osmosis (3\*) dialysis
- 5. As<sub>2</sub>S<sub>3</sub> sol is :

2.

3.

(4) peptization

- [AIIMS 1998] (4) All of these
  - [AIIMS 2001]

	(1) positive colloid	(2*) negative colloid	(3) neutral colloid	(4) none of the above
6.	An emulsifier is a subst (1) which can convert e (2) which breaks the em (3*) which stabilizes an (4) which brings about o	ance : very liquid into an emuls nulsion into its constituer emulsion. coagulation of an emulsio	ion. It luqids. on.	
7.	When a strong beam of (1) be reflected	light is passed through a (2*) be scattered	a colloidal solution, the lig (3) be refracted	ght will: <b>[Kerala CEE 2002]</b> (4) give a rainbow
8.	Colloid of which one of t method ? (1) Sulphur	the following can be prep (2) Ferric hydroxide	ared by electrical dispers (3) Arsenious sulphide	ion method as well as reduction <b>[Tamil Nadu 2002]</b> (4*) Gold
9.	Which one of the follow (1) Emulsion-curd	ing is correctly matched (2) Foam-mist	? (3*) Aerosol-smoke	<b>[Tamil Nadu 2002]</b> (4) Solid sol-cake
10.	Arsenic sulphide is a ne (1) AICI <sub>3</sub>	egative sol. The reagent ( (2) NaCl	with least precipitating pc (3) CaF <sub>2</sub>	ower is : <b>[Manipal PMT 2002]</b> (4*) Glucose
11.	The formation of colloid (1*) peptisation	from suspension is : (2) condensation	(3) sedimentation	[Manipal PMT 2002] (4) fragmentation
12.	Which one of the follow (1) Starch	ing substances is not us (2) Gum	ed for preparing lyphillic s (3) Gelatin	sols ? [MP PET 2002] (4*) Metal sulphide
13.	Which among the follow (1) Increase of pressure (2) Increase of tempera (3) The adsorption may (4*) Particle size of the	ving statements is false a increases the amount of ture may decrease the a be monolayered or mult adsorbent will not affect	of adsorption. mount of adsorption. ilayered. the amount of adsorption	[KCET 2002]
14.	Adsorbed acetic acid or (1) absorbate	n activated charcoal is : (2) absorber	(3) adsorbent	[MP PMT 2002] (4*) adsorbate
14. 15.	Adsorbed acetic acid or (1) absorbate Identify the gas which is	n activated charcoal is : (2) absorber s readily adsorbed by act	(3) adsorbent tivated charcoal.	[MP PMT 2002] (4*) adsorbate [Karnataka CET 2004]
14. 15.	Adsorbed acetic acid or (1) absorbate Identify the gas which is (1) N <sub>2</sub>	n activated charcoal is : (2) absorber s readily adsorbed by act (2*) SO <sub>2</sub>	(3) adsorbent tivated charcoal. (3) H <sub>2</sub>	[MP PMT 2002] (4*) adsorbate [Karnataka CET 2004] [Karnataka CET 2004] (4) O <sub>2</sub>
14. 15. 16.	Adsorbed acetic acid or (1) absorbate Identify the gas which is (1) $N_2$ An example of autocata (1) oxidation of NO to N (3) decomposition of KO	n activated charcoal is : (2) absorber s readily adsorbed by act (2*) SO <sub>2</sub> alysis is : IO <sub>2</sub> CIO <sub>3</sub> to KCI and O <sub>2</sub>	<ul> <li>(3) adsorbent</li> <li>tivated charcoal.</li> <li>(3) H<sub>2</sub></li> <li>(2) oxidatin of SO<sub>2</sub> to SO (4*) oxidation of</li> </ul>	[MP PMT 2002] (4*) adsorbate [Karnataka CET 2004] [Karnataka CET 2004] (4) O <sub>2</sub> [Karnataka CET 2006] O <sub>3</sub> f oxalic acid by acidified KMnO <sub>4</sub>
14. 15. 16. 17.	Adsorbed acetic acid or (1) absorbate Identify the gas which is (1) $N_2$ An example of autocata (1) oxidation of NO to N (3) decomposition of XO The coagulation of 200 changing the volume m (1) 0.36	n activated charcoal is : (2) absorber s readily adsorbed by act (2*) SO <sub>2</sub> alysis is : $IO_2$ CIO <sub>3</sub> to KCI and O <sub>2</sub> 0 mL of a positive colloid uch. The flocculation val (2) 36.5	<ul> <li>(3) adsorbent</li> <li>tivated charcoal.</li> <li>(3) H<sub>2</sub></li> <li>(2) oxidatin of SO<sub>2</sub> to SO (4*) oxidation of</li> <li>d took place when 0.73</li> <li>ue of HCl for the colloid is (3*) 100</li> </ul>	[MP PMT 2002] (4*) adsorbate [Karnataka CET 2004] (4) O <sub>2</sub> [Karnataka CET 2006] O <sub>3</sub> f oxalic acid by acidified KMnO <sub>4</sub> g HCl was added to it without s : [Kerala PMT 2006] (4) 150
14. 15. 16. 17. 18.	Adsorbed acetic acid or (1) absorbate Identify the gas which is (1) N <sub>2</sub> An example of autocata (1) oxidation of NO to N (3) decomposition of KO The coagulation of 200 changing the volume m (1) 0.36 Which of the following is (1) $\Delta G < 0$ , $\Delta S > 0$ , $\Delta H < 0$ (3) $\Delta G > 0$ , $\Delta S > 0$ , $\Delta H < 0$	n activated charcoal is : (2) absorber s readily adsorbed by act (2*) SO <sub>2</sub> alysis is : IO <sub>2</sub> CIO <sub>3</sub> to KCI and O <sub>2</sub> 0 mL of a positive colloid uch. The flocculation val (2) 36.5 s true in respect of adsor < 0 < 0	(3) adsorbent tivated charcoal. (3) H <sub>2</sub> (2) oxidatin of SO <sub>2</sub> to SO (4*) oxidation of d took place when 0.73 ue of HCl for the colloid is (3*) 100 rption ? (2*) $\Delta G < 0$ , $\Delta S < 0$ , $\Delta H =$ (4) $\Delta G < 0$ , $\Delta S > 0$ , $\Delta H =$	[MP PMT 2002] (4*) adsorbate [Karnataka CET 2004] [Karnataka CET 2004] (4) O <sub>2</sub> [Karnataka CET 2006] O <sub>3</sub> f oxalic acid by acidified KMnO <sub>4</sub> g HCl was added to it without s : [Kerala PMT 2006] (4) 150 [Kerala PET 2006] < 0 > 0
14. 15. 16. 17. 18. 19.	Adsorbed acetic acid or (1) absorbate Identify the gas which is (1) N <sub>2</sub> An example of autocata (1) oxidation of NO to N (3) decomposition of KO The coagulation of 200 changing the volume m (1) 0.36 Which of the following is (1) $\Delta G < 0$ , $\Delta S > 0$ , $\Delta H < 0$ (3) $\Delta G > 0$ , $\Delta S > 0$ , $\Delta H < 0$ If (x/m) is the mass of adsorbate gas and a sisotherm'?	n activated charcoal is : (2) absorber s readily adsorbed by act (2*) SO <sub>2</sub> alysis is : IO <sub>2</sub> CIO <sub>3</sub> to KCI and O <sub>2</sub> 0 mL of a positive colloir uch. The flocculation val (2) 36.5 s true in respect of adsor < 0 < 0 the adsorbates adsorber and b are constants, w	(3) adsorbent tivated charcoal. (3) H <sub>2</sub> (2) oxidatin of SO <sub>2</sub> to SO (4*) oxidation of d took place when 0.73 ue of HCl for the colloid is (3*) 100 rption ? (2*) $\Delta G < 0$ , $\Delta S < 0$ , $\Delta H >$ (4) $\Delta G < 0$ , $\Delta S > 0$ , $\Delta H >$ d per units mass of adsor-	[MP PMT 2002] (4*) adsorbate [Karnataka CET 2004] [Karnataka CET 2004] (4) O <sub>2</sub> [Karnataka CET 2006] O <sub>3</sub> f oxalic acid by acidified KMnO4 g HCI was added to it without s : [Kerala PMT 2006] (4) 150 [Kerala PET 2006] < 0 > 0
14. 15. 16. 17. 18. 19.	Adsorbed acetic acid or (1) absorbate Identify the gas which is (1) N <sub>2</sub> An example of autocata (1) oxidation of NO to N (3) decomposition of KO The coagulation of 200 changing the volume m (1) 0.36 Which of the following is (1) $\Delta G < 0, \Delta S > 0, \Delta H < 0$ (3) $\Delta G > 0, \Delta S > 0, \Delta H < 0$ If (x/m) is the mass of adsorbate gas and a sisotherm'? (1) $\log \left(\frac{x}{m}\right) = \log \left(\frac{a}{b}\right)^{2}$ (3*) $\frac{1}{(x/m)a} + \frac{1}{ap}$	h activated charcoal is : (2) absorber is readily adsorbed by act (2*) SO <sub>2</sub> alysis is : IO <sub>2</sub> CIO <sub>3</sub> to KCI and O <sub>2</sub> 0 mL of a positive colloid uch. The flocculation val (2) 36.5 is true in respect of adsort < 0 < 0 the adsorbates adsorber and b are constants, w $+\frac{1}{a} \log p$ (2) m (4) $\overline{(x)}$	(3) adsorbent tivated charcoal. (3) H <sub>2</sub> (2) oxidatin of SO <sub>2</sub> to SO (4*) oxidation of d took place when 0.73 ue of HCl for the colloid is (3*) 100 rption ? (2*) $\Delta G < 0$ , $\Delta S < 0$ , $\Delta H >$ (4) $\Delta G < 0$ , $\Delta S > 0$ , $\Delta H >$ d per units mass of adsorbich of the following replace thich of the following replace $= \frac{b}{a} + \frac{1}{ap}$ $\frac{1}{a/m} = \frac{a}{b} + \frac{p}{a}$	[MP PMT 2002] (4*) adsorbate [Karnataka CET 2004] [Karnataka CET 2004] (4) O <sub>2</sub> [Karnataka CET 2006] O <sub>3</sub> f oxalic acid by acidified KMnO <sub>4</sub> g HCl was added to it without s : [Kerala PMT 2006] (4) 150 [Kerala PET 2006] < 0 > 0 orbent, p is the pressure of the presents 'Langmuir adsorption [Kerala PET 2006]

21.	<ul> <li>Although nitrogen does not adsorb on surface at room temperature, it adsorbs or 83K. Which one of the followings statement is correct ?</li> <li>(1) At 83 K, there is formation of monomolecular layer.</li> <li>(2*) At 83 K, there is formation of multimoleculars layer.</li> <li>(3) At 83 K, nitrogen molecules are held by chemical bonds.</li> <li>(4) At 83 K, nitrogen is adsorbed as atoms.</li> </ul>						the same surface at <b>HP PMT 2006]</b>	
22.	The gol	d numbers of so Colloid A B C	me colloids Go	are given be ld Number 0.01 2.5 20	elow :		[	J & K CET 2006]
	The pro (1) C >	otective nature of B > A	these colloi (2*) A > B >	ds follows th ▸ C	ne order : (3) A = B = 0	C	(4) B > A	> C
23.	Which o (1) mag	one of the followi nesium chloride	ng acts as tl (2) hydroch	he best coaç loric acid	gulating agent (3) aluminiur	t of ferric hy m chloride	droxide so (4*) pota	ol ? ssium ferricyanide
24.	Which a 1. 2. 3. 4. 5. (1) 1 &	among the follow The extent of a The extent of a The extent of a The extent of a Freundich adso 3	ing stateme dsorption is d dsorption is d dsorption is dsorption is rption isothe (2) 1 & 4	nts are corre equal to k P <sup>r</sup> equal to k P equal to (1 + equal to a P erm fails at lo	ects with response of according to $1/n$ according to $1/n$ according to $bP$ / a P according t / (1 + b P) accord (2 + b P) accord (3 + b P)	ect to adsor Freundlich o Freundlic cording to L ccording to l	rption of g isotherm. h isotherm angmuir is Langmuir (4*) 2 & 4	ases on a solid ? n. sotherm. isotherm. 1
25.	The phy are: (1) solic	/sical states of di I, gas	spersing pha (2) gas, liqu	ase and disp Iid	ersion mediur (3*) liquid, ga	m in colloid <b>[Gujara</b> as	like pestic at CET 20 (4) liquid	ide spray respectively <b>07]</b> , solid
26.	Match li the cod (A) (B) (C) (D)	ist I (Colloidal dis es given below t List I (Colloidals dis Milk Clouds Paints Jellies	spersion) wit he lists. <b>persion)</b>	(1) (2) (3) (4)	ure of the disp List (Nature of d Solid in liquid Liquid in gas Solid in solid Liquid in liqu	bersion) and II Iispersion) ds S I I I I	d select th	e corret answer using SCRA 2007]
27.	Plot of I and Fre (log5=0 log x/m 0.5 atm gksxhA	log x/m against l eundich paramet .6690). rFkk log P ds e/ rFkk ÝsaM+fyj (log5=0.6690).	og P is a sti er, K is 10.0 ′; vkjs[k 45º o ekiØe K =	(5) raight line in , then amou dks.k dks iz 10.0 gS, rc	Liquid in soli clined at an a int of the solu znf'kZr djrs g ; izfrxzke vf/	id ingle of 45º te adsorbed q; ,d lh/kh k'kks''kd }k	. When th d per gran js[kk esa kjk vf/k'kl	e pressure is 0.5 atm n of adsorbent will be izkIr gksrk gS tc nkc ksf"kr foy; dh ek=kk
	(1) 1 g		(2) 2 g		(3) 3 g		(4*) 5 g	Relaia FET 2000j
28.	The nur	mber of moles of	lead nitrate	needed to c	coagulate 2 m	ol of colloid	al [AgI]I⁻ i	s : [Kerala PET 2008]
	(1) 2		(2*) 1		(3) 1/2		(4) 2/3	
29.	The bas (1*) neu (3) Le-0	sic principle of C utralisation of cha Chatelier's princi	ottrells' prec arge on collo ple	ipitator is : bidal particles	s(2) scattering (4) peptisatio	g of light on	[	Karnatka CET 2008]
30.	The prir (1*) Ads	nciple(s) involved sorption	d in the chro (2) Absorpt	matographic ion	c operation is (3) Partition	(are) :	(4) None	[AIIMS 1996]
31.	The size (1) 10 <sup>-1</sup>	e of collodial par <sup>2</sup> to 10 <sup>-19</sup> m	ticle is (2) 10 <sup>-3</sup> to 2	I0 <sup>–9</sup> m	(3) 10 <sup>_9</sup> to 10	0 <sup>-12</sup> m	(4*) 10 <sup>-6</sup>	<b>[AIIMS 1999]</b> to 10 <sup>_9</sup> m
32.	Identify the correct statement regarding enzymes. [AIIMS 2004]							

- (1) Enzymes are specific biological catalysts that can normally function at very high tempt. (T ≈ 1000 K)
- (2\*) Enzymes are normally heterogeneous catalysts that are very specific in action
- (3) Enzymes are specific biological catalysts that can not be poisoned
- (4) Enzymes are non-biological catalysts.
- 33. S<sub>1</sub>: The extent of adsorption increases with increase in specific area of adsorbent. S<sub>2</sub>: Ammonia is adsorbed by water while it is absorbed by charcoal. S<sub>3</sub>: Colour of a colloidal solution depends upon the size and shape of sol particles. (1) T T F (2) F T F (3\*) T F T (4) F T T
  34. S<sub>1</sub>: The higher the valency of effective ion, the lower is its coagulation power. S<sub>2</sub>: Cod-liver oil is an O/W emulsion. S<sub>3</sub>: Brownian motion is due to continuous bombardment of sol particles by molecules of disperson

S<sub>3</sub>: Brownian motion is due to continuous bombardment of sol particles by molecules of dispersor medium.

- (1) T T F (2) F T F (3) T F T (4\*) F F T
- 35. S<sub>1</sub>: For a positive sol, flocculation values are in the order NaCl > K<sub>2</sub>SO<sub>4</sub> > Na<sub>3</sub>PO<sub>4</sub> > K<sub>4</sub>[Fe(CN)<sub>6</sub>].
  S<sub>2</sub>: Hydrophilic sols are irreversible.
  S<sub>3</sub>: When negatively charged smoke comes in contact with positively charged clouds, rain fall takes place.
  (1) TTF
  (2) FTF
  (3\*) TFT
  (4) FFT