

# Surface Chemistry (Solutions).

Level 1.

Ans. Colloidal solution is made up of 2 phase.

- dispersed phase
- dispersion medium.

Ans. 2. **fact**

Ans. 3. Lyophobic colloids are irreversible.

Ans. 6. Ans. 7. Gold no. is the measure of protective power of the lyophilic colloids.

Ans. 8. By definition, gold no. of starch is the amount of starch in mg added to 10 ml standard gold solution which prevents coagulation of gold on adding 1 ml 10% NaCl.

So amount of starch = 0.25 g = 250 mg.  
Gold no = 250

Ans. 10. Micelles are <sup>also</sup> called associated colloids.  
Both soap & detergent form micelles.

Ans. 11. Gold no  $\propto \frac{1}{\text{protective power}}$

So higher the gold no, lesser is the protecting power.

Ans. 12. Higher is the valency, higher flocculation value. Pg 4+.

Ans. 15. Gelatin is a hydrophilic colloid.



Ans. 17 : Associated colloid, soap solution

Ans. 19. Hydrophobic colloids are generally inorganic in nature.

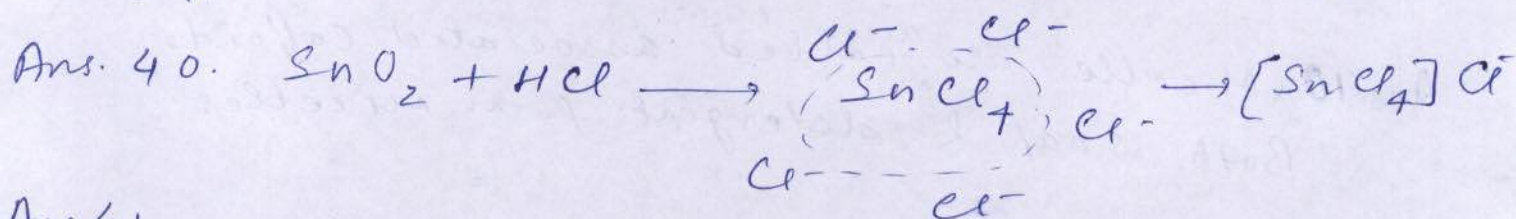
Ans. 20. Particle size of colloids are in nanometer range, so ~~the~~ separation is not possible.

Ans. 22. <sup>Due to</sup> Inverse relationship between gold no & protective power.

Ans. 27. Colloidal particles being bigger aggregates, the no. of particles in a colloidal solution is comparatively smaller as compared to true solution. Hence the properties are lower than true ~~sol~~ solutions.

Ans. 36. for the coagulation, higher valency of ions are required. Among the options  $K_3[Fe(CN)_6]$ , Fe has +3 charge.

Ans. 37. In case of 100 ml 0.1 M  $AgNO_3$  & 100 ml 0.15 M KI, ~~no~~ amount of KI is more so it can form a negatively charged sol.



Ans 41

Ans. 42. Gold no.  $\Rightarrow$  no. of mg of sol lyophilic sol. to protect 10 ml of lyophilic sol, say x mg  
so for 1000 ml 100 mg.

$$\text{Gold no.} = \frac{1000}{100} = 10 \text{ mg}$$



Ans. 43.  $Al^{3+}$ , highly valent metal for negatively charged suspension.

Ans 44. factual.

Ans 45. factual

Ans 46. "

Ans 49. Heat of adsorption is low, and no appreciable activation energy is involved in physical adsorption. So it is favoured at lower temp.

~~Ans 50~~

### Level-II

Ans 1. factual

Ans 2. "

3. "

4. It is an example of physical adsorption.

$P \propto \frac{x}{M}$ , so  $P \uparrow$ , amount  $\uparrow$

$\Delta H = \text{exothermic}$ ,  $\therefore T \uparrow$  amount  $\downarrow$ .

Ans. 6-11. factual.

Ans 13. Rate =  $K[A]$ , at equilibrium amount does not change  
so  $\uparrow$  in Rate will  $\uparrow$  rate constant.

Ans. 15-18. factual.

Ans. 23.  $\Delta H = -ve$  for adsorption

Ans 24.



polar outer

Non polar inner

## Assertion Reason

Ans. 2.  $\Rightarrow$  A: Enthalpy of chemisorption  $>$  Enthalpy of physisorption  
R: True.

Ans. 3 & 4. A: True.

R: Variation ~~of~~ is with P.

$$\frac{x}{M} \propto p^{1/n}$$

Ans. 5-13. Factual.

Ans. 14. A: True.

R: false, Ammonia is a polar molecule

Ans. 15-19. Factual.



# Adsorption & Ads. Isotherm

1. (d)  $\Delta H =$  highly negative

$\Delta S = -ve$ , so that  $\Delta G = -ve$

2. (c)  $1/n \Rightarrow$  Between 0 to 1.

When  $1/n = 0$ ,  $x/m = \text{constant}$  (Adsorption is independent of Pressure)

When  $1/n = 1$ ,  $\frac{x}{m} = k_p$

i.e.  $\frac{x}{m} \propto P$  (Adsorption values directly proportional to Pressure).

3. a)  $\frac{x}{m} = P \times T$  is not the correct expression.

4, 5, 6 = factual.

7-11. "

12-14. "

16. c) Gases which are easily liquifiable (i.e. with higher critical temp.) are readily adsorbed.

~~17. & 18.~~ 17. & 18. factual.

19. A/c to Langmuir Adsorption isotherm

$$\frac{x}{m} = \frac{aP}{1+bP}, \text{ If } P \overset{\text{is}}{\gg} \text{high } 1+bP \approx bP.$$

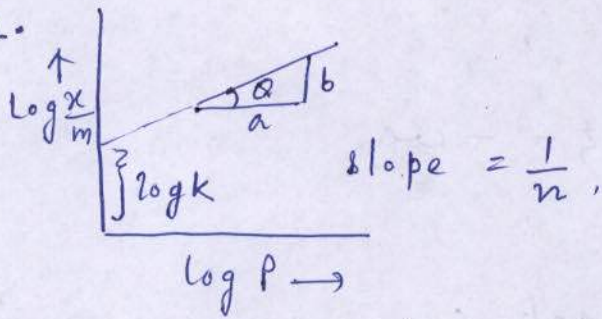
$$\frac{x}{m} = \frac{aP}{bP} = \frac{a}{b}.$$

Option (b) is correct.



20. factual.

22.



$$\log \frac{x}{m} = \log k + \frac{1}{n} \log P$$

23. factual.

24. c) Conc. decreases due to adsorption.

26-28. factual.

### Colloids, Emulsions, Micelles.

1-4. factual

5. With positive sol,  $[\text{Fe}(\text{CN})_6]^{4-}$  has maximum coagulation power. High charge " " " "

6-9. factual.

10(c) Gold no.  $\propto \frac{1}{\text{protective power}}$ .

11. factual.

13. Lower the value of gold no., higher is the protecting power & effective action.

14, 15. factual.

16.  $\text{As}_2\text{S}_3$  is negative sol.

$\text{AlCl}_3$  has  $\text{Al}^{3+}$ , high charge & so it will cause effective coagulation.



17-18. factual.

20 "

22-25. "

26. According to Hardy Schulze rule, higher the charge, higher is the coagulation power.

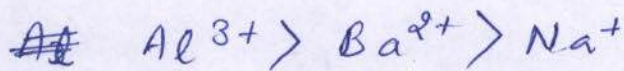
(b)

27. Gelatin ~~is~~ has the highest protecting power, so least gold no.

28-31. Factual.

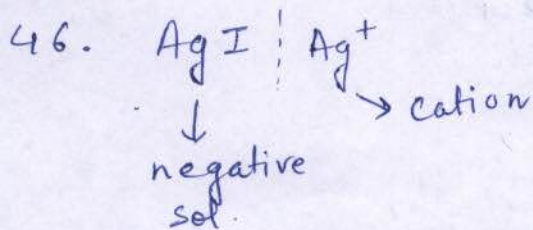
33-36. "

37. Arsenious sol is negatively charged so the order of cation should be.



38-42. factual.

44-45. "



47-48 - factual.

49. According to definition of gold no.

$10^{-4}g$  in  $100\text{ cm}^3$  of gold solution

so  ~~$10^{-4}g / 100\text{ cm}^3$~~   $\frac{10^{-4}g \times 100\text{ cm}^3}{1000\text{ cm}^3} = 10^{-5}g$   
 $= 10^{-2}mg$   
 $= 0.01mg$

50 to 54. factual.



55. Refer level 1, Ans 8.

56-57. Factual.

58.  $As_2S_3 \Rightarrow$  negative sol.

$Al^{3+}$  is best

59-62. Factual.

63. Sugar solution is true solution,

### Catalyst.

1-5. Factual.

6. Catalyst is in the same phase as that of reactant. So homogeneous catalysis.

7-9. Factual.

10. One of the product behave as catalyst hence no external catalyst is added.

Reaction is  $\downarrow$  auto catalysis.  
an example of

11-22 - Factual.

23.

24. Hydrolysis of ethyl acetate takes place in acidic medium, so  $H_2SO_4$ .

25-28. Factual.