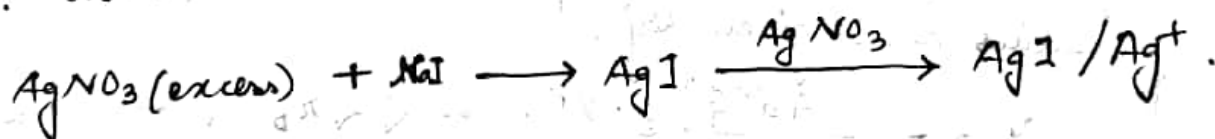


2014:

Q) A positively charged AgI sol can be prepared by adding dilute solution of NaI to a slight excess of dilute solution of AgNO₃. State why the colloidal particles are positively charged. (1)

2014

Ans: 1. When a dilute soln of NaI is added to a dilute slight excess of dilute solution of AgNO₃, a positively charged sol of silver iodide (AgI) is generated. This formation of positively charged sol is because of absorption of silver ions (Ag⁺) from the dispersion medium on the precipitate formed by AgI. The reaction is shown below:



2019
2017
Q For As_2S_3 sol, the flocculation values of NaCl solution and KCl solution are almost the same, though $CaCl_2$ solution has much less flocculation value. Explain this observation. (2)

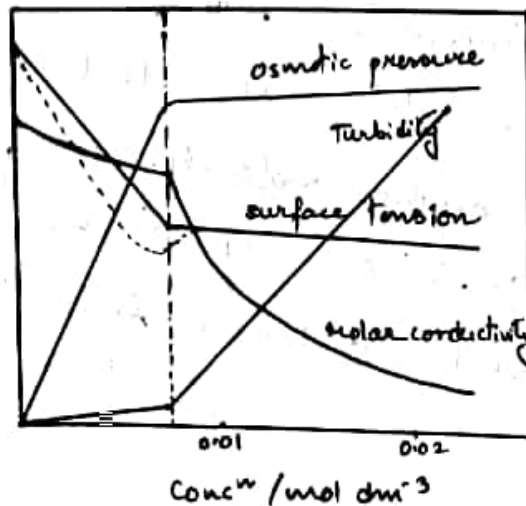
Ans: 2. The minimum concentration of an electrolyte required to cause coagulation or flocculation of a sol is called its flocculation value. The efficacy of an ion to cause coagulation depends upon its valency. ~~Thus~~ The efficacy varies directly as the square of the valency of the ion. Thus, Ca^{2+} is 4 times more effective than Na^+ and K^+ ions in flocculating As_2S_3 sol. ~~Thus for~~ Hence, for As_2S_3 solⁿ, even though the flocculation values of NaCl solⁿ and KCl solⁿ are almost same, $CaCl_2$ solⁿ has much less flocculation value.

3 Explain how the formation of micelle affects the electrical conductivity and the osmotic pressure of the solution. (2)

2014, 2016, 2017

Ans: 3

Solutions of highly surface-active materials often exhibit unusual physical properties. In dilute solution the surfactant acts as a normal solute. At fairly well defined concentrations; however, abrupt changes in several physical properties, such as osmotic pressure, turbidity, electrical conductance and surface tension, take place. The rate at which osmotic pressure increases with concentration becomes abnormally low and the rate of increase of turbidity with concentration is much enhanced, which suggests that considerable association is taking place. The conductance of ionic surfactant solutions, however, remains relatively high which shows that ionic dissociation is still in force. The effect can be illustrated with the help of the following figure,



Q26 Explain why protein-in-water sol undergoes coagulation on addition of alcohol. (2)

2016

Ans: 26. Protein-in-water sol undergoes coagulation on addition of alcohol because alcohol denatures protein. Alcohol breaks the bonds that hold parts of the protein in a folded shape. Further, the alcohol molecules bond directly to some of the parts of the protein, disrupting the normal way the protein would bond to itself. Alcohol mainly denatures a protein mainly by disrupting the intramolecular hydrogen bonding between the side chains, which is essential to mainly maintain the tertiary protein structure. Besides, ~~some~~ the alcohol molecules compete ~~to~~ with the amino acid residues to participate in forming new hydrogen bonds, which distances the side chains from

each other and thus breaks protein's tertiary structure. Besides, some alcohols can also interact with the hydrophobic residues in a protein, destroying its hydrophobic core and resulting in denaturation.

Q21 Explain why deltas are formed at a place where rivers meet the sea. ③

Ans: 21. River water consists of negatively charged clay particles of colloidal dimension. When the river falls into the sea, the clay particles are coagulated by the positive Na^+ , K^+ , Mg^{2+} ions, etc. present in sea water and forms new lands called deltas.

Q11 Write the basic difference between electrophoresis and electro-osmosis. (1)

2015

Ans:- 11. The basic difference between electrophoresis and electro-osmosis is that in electrophoresis, colloidal particles are allowed to move under the influence of an applied electric field while in electro-osmosis, the dispersion medium is allowed to move under the influence of an electrical field, whereas colloidal particles are not allowed to move.

✓48) When a freshly prepared precipitate of $\text{Fe}(\text{OH})_3$ is treated with water and a small amount of FeCl_3 solⁿ, $\text{Fe}(\text{OH})_3$ is converted to colloidal solution. What is the role of FeCl_3 in this process? (1)

2018:

Ans: 48: When a freshly prepared precipitate of $\text{Fe}(\text{OH})_3$ is treated with water and a small amount of FeCl_3 solⁿ, $\text{Fe}(\text{OH})_3$ is converted to colloidal solⁿ. The role of FeCl_3 in this process is to bring about peptization of $\text{Fe}(\text{OH})_3$ sol.

Q12 Addition of NaCl solution to Au sol results in coagulation of the sol. But in presence of soluble starch addition of NaCl solution cannot affect precipitation of Au sol. Explain this observation. (2)

2015.

Ans: 12. Starch forms lyophilic sol with water. When NaCl solution is added to Au sol it undergoes the reverse coagulation to form lyophobic sol. But, when in the presence of soluble starch addition of NaCl solⁿ cannot affect precipitation of Au sol. It is because when starch is added to the mixture, it forms a 'cage' that serves as a barrier preventing the coagulation of the sol, i.e. starch acts as a protective colloid.

2015

17 Explain why colloid solutions are thermodynamically unstable. (3)

Ans: 17. Colloids are thermodynamically unstable with respect to the bulk. This instability can be expressed thermodynamically by noting that because the change in Gibbs's energy, dG , when the surface area of the sample changes by $d\sigma$ at constant temperature and pressure is $dG = \gamma d\sigma$, where γ is the interfacial surface tension, it follows that $dG < 0$ if $d\sigma < 0$. The survival of colloids ~~are~~ must therefore be a consequence of the kinetics of collapse: colloids are thermodynamically unstable but kinetically nonliable.

Q40 "A colloidal solution is not precipitated on the addition of an electrolyte in presence of gelatin". Explain. (2)

2017:
Ans: 40. Gelatin behaves as protective colloids. Protective colloids are substances which protect a lyophobic colloid from precipitation by the action of electrolytes. They function by getting absorbed on the solid surface in the form of loops wherein water gets trapped. These loops

prevent the approach of particles to cause coagulation.
Thus, "A colloidal solution is not precipitated on the
addition of an electrolyte in presence of gelatin".

2015

Q. State why lyophilic sols are more stable than lyophobic sols. (1)

Ans: Lyophilic sols are more stable than lyophobic sols due to the presence of strong, favourable solvent-solute interactions in lyophilic sols.