LEC.6 : Precipitation Titration

What is Precipitation Titration?

Precipitation titration is a type of titration which involves the formation of precipitate during the titration technique.

In precipitation titration, the titrant reacts with the analyte and forms an insoluble substance called a precipitate. It continues till the last amount of analyte is consumed.

It is a titrimetric method which involves the formation of precipitates during the experiment of titration. The titrant reacts with the analyte and forms an insoluble substance. The titration is continued till the last drop of the analyte is consumed. When the titrant is excess it reacts with the indicator and signals to terminate the titration process.

Precipitation Titration Example

Example – To determine the concentration of chloride ion in a certain solution we can titrate this solution with silver nitrate solution (whose concentration is known). The chemical reaction occurs as follows:

$$Ag^{+}(aq) + Cl^{-}(aq) \rightarrow AgCl(s).$$

AgCl in the form of a white precipitate can be seen settled at the bottom of the flask during titration. The quantity of silver ion used to the equivalence point is equal to the quantity of chloride ion which was originally present.

To calculate the number of moles of chloride ion or silver ion we can use $n = cV$ …(molarity definition)

To calculate the volume of the added solution or molar concentration of ion the corresponding values of either of the ions should be known.

Where n is the number of moles, c is the concentration and V is the volume in dm^3.

Types of Precipitation Titration

Volhard's method

This method involves the titration of bromides, iodides, and chlorides, in an acidic medium. The chloride in the solution is converted to silver chloride when reacted with excess silver nitrate solution.

Fajan's method

This method uses the reaction between the precipitate formed and indicator. The indicator used is dichlorofluorescein which acts as an anion in solution.

Mohr's method

This method is used to determine chlorides in a neutral solution. The chromate ion in acidic conditions is protonated to form chromic acid.

Frequently Asked Questions – FAQs

Q1 : Why do precipitation reactions occur?

When a solution containing a particular cation (a positively charged ion) is combined with another solution containing a certain anion (a negatively charged ion), the formation of an insoluble compound can often occur which is called precipitate. A precipitate is considered the solid that divides.

Q2 : Is precipitation a sign of a chemical reaction?

The formation of a precipitate also suggests the presence of a chemical reaction. When a silver nitrate solution is poured into a sodium chloride solution, a chemical reaction occurs, producing a white silver chloride precipitate.

Q3 : What is an example of the formation of precipitate?

When a silver nitrate solution is poured into a sodium chloride solution, a chemical reaction occurs, producing a white silver chloride precipitate. A yellow lead(II) iodide precipitate is formed when the potassium iodide solution reacts with the lead(II) nitrate solution.

Q4: Is Salt a precipitate?

The insoluble salt falling out of the solution is referred to as the precipitate, hence the name of the reaction. Precipitation reactions in the solution can help determine the identity of different ions. Water-soluble salts are not precipitates

Q5: What are the applications of precipitation titration?

Precipitation Titrations help to find out the amount of salt content in food and beverages and analyse drugs and halide ions In solution.