Precipitation Titration in Chemistry Questions with Solutions

Q1. In the volhard Method, the solution filled in the burette is–

a.) Silver Nitrate
b.) Ferric ammonium sulphate
c.) Potassium thiocyanate
d.) Potassium Chromate

Correct Answer– (c.) Potassium thiocyanate.

Q2. The indicator used in the Mohr method is–

a.) Fe^{3+}
b.) Fluorescein
c.) Potassium chromate
d.) Eosin

Correct Answer– (c.) Potassium chromate

Q3. Which of the following is/are indicators for precipitation reaction?

a.) Potassium Chromate
b.) Silver Nitrate
c.) Fluorescein ions
d.) All of the above

Correct Answer– (d.) All of the above.

Q4. The precipitation titration in which ____ nitrate is used is called argentometric titration.

a.) Silver
b.) Potassium
c.) Sodium
d.) Ammonium

Correct Answer– (a.) Silver.

Q5. The endpoint of precipitation titration can be detected by which of the following?

a.) The appearance of excess titrant
b.) The concentration of ions

c.) The disappearance of the reactant
d.) None of the above

Correct Answer– (a.) The appearance of excess titrant and (c.) The disappearance of the reactant.

Q6. What is a precipitation reaction?

Answer. When two solutions containing soluble salts are mixed, a precipitation reaction occurs, resulting in the formation of an insoluble salt. The precipitate is the insoluble salt that emerges from the solution. Precipitation reactions in the solution can aid in determining the identity of various ions.

Q7. What are the various types of precipitation titration?

Answer. Precipitation titrations are classified into three types:

- The Volhard Method.
- The Fajan Method.
- The Mohr Method.

Q8. Explain the Volhard method and the Fajan method of precipitation titration.

Answer. The Volhard method is a type of precipitation titration that is used to determine the bromine, chlorine, and iodine content of a halide by precipitating it with excess silver nitrate and titrating the excess by adding standard potassium thiocyanate (KSCN). It is carried out in an acidic solution.
The Fajan method is a type of precipitation titration that uses the reaction between the produced precipitate and the predictor. Dichlorofluorescein is a solution indicator that acts as an anion.

Q9. How can the endpoint be determined in precipitation titrations?

Answer. Three traditional methods based on colour indicators can be used to identify endpoints in argentometric titration.

- The formation of coloured precipitate at the endpoint in Mohr's titration
- The formation of a soluble, coloured complex at the endpoint of Volhard's titration
- Adsorption of a coloured indicator on the precipitate at the endpoint in Fajan's titration

Q10. What are precipitation titrations used for?

Answer. It is used to determine the concentration of halide ions in a solution. It is used to determine the salt content of foods, beverages, and water. It is used to make sulphur, thiocyanate, dichromate, and other chemicals. Many drugs, including carbromal, KCl infusion, NaCl infusion, and others.

Q11. Which indicators are used in precipitation titration?

Answer. To act as an indicator, a small volume of potassium chromate solution is added, followed by a neutral solution of, say, chloride ions of silver nitrate solution. At the endpoint, the chromate ions interact with the silver ions to form the sparingly soluble, red, silver chromate.

Q12. What is the difference between Mohr Volhard's and Fajans methods?

Answer. The main difference between the Mohr and Volhard methods is that the Mohr method refers to the reaction between silver ion and halide ion in the presence of chromate indicator, whereas the Volhard method refers to the reaction between excess silver ions and halide ions. Meanwhile, the Fajans method refers to the reaction of silver halide and fluorescein adsorption.

Q13. Explain precipitation titration with the help of an example.

Answer. We can titrate a sample solution with a known concentration of silver nitrate solution to estimate the chloride ion concentration.

- The chemical reaction is as follows: $Ag^+(aq) + Cl^-(aq) \rightarrow AgCl(s)$
- During the titration, AgCl forms a white precipitate at the bottom of the conical flask.
- The amount of silver ion used to reach the equivalence point is the same as the initial amount of chloride ion.
- To calculate the number of moles of silver or chloride ion, use $n = cV$.

Q14. What is the limitation of precipitation reactions?

Answer. There are several limitations to the precipitation titration process as well:

- The precipitation titration method can only titrate a small number of halide ions.
- Coprecipitation can also occur.
- The endpoint is extremely difficult to assess.

Q15. What is the significance of precipitation titration?

Answer. The significance of precipitation titration includes the following:

- Precipitation titration can provide a quick and accurate analysis result.
- The process of precipitation titration can be automated.
- It does not necessitate any specialised knowledge.
- Mohr's method of precipitation titration is a simple, direct and accurate method for determining chloride ions.
- Volhard's precipitation titration method can be used for both direct and indirect halide analysis.
- Fajan's precipitation titration method can be used with various indicators over a wide range of pH levels.

Practice Questions on Precipitation Titration

Q1. The titration brake of the precipitation curve depends on-

a.) The concentration of the Analyte
b.) Solubility product of the precipitate
c.) Temperature
d.) Nature of the indicator

Correct Answer– (b.) Solubility product of the precipitate.

Q2. Which of the following compounds cannot be analysed in the Mohr method?

a.) NaI
b.) KCl
c.) MgBr
d.) $CaCl_2$

Correct Answer– (a.) NaI.

Q3. What are the primary titration standards for precipitation?

Answer. Although precipitation titrimetry is rarely used as a standard method of analysis, it can be used as a secondary analytical method to verify other methods. The titrant or titrand in most precipitation titrations is Ag^+. A titration in which Ag^+ is the titrant is called an argentometric titration.

Q4. What is Mohr's method of precipitation titration?

Answer. Titration with silver nitrate is used to determine the chloride ion concentration of a solution. A precipitate of silver chloride forms as the silver nitrate solution is slowly added.
$Ag^+ (aq) + Cl^- (aq) \rightarrow AgCl (s)$
When all of the chloride ions have precipitated, the titration is complete. Then, additional silver ions react with the indicator's chromate ions to form a red-brown precipitate of silver chromate.
$2Ag^+(aq) + CrO_4^{2-} (aq) \rightarrow Ag_2CrO_4 (s)$
This method can be used to determine the concentration of chloride ions in water samples from a variety of sources, including seawater, stream water, river water, and estuary water.

Q5. What is the titration principle of precipitation?

Answer. The basic principle of precipitation titration is that the amount of precipitating reagent or precipitant added is equal to the amount of precipitated substance.

Amount of precipitating agent added = Amount of precipitated compound