What is Quantitative Analysis and Gravimetry?

Worksheet

Gravimetric analysis isolates a target ion as an insoluble compound, filters, dries and weighs it to find the original amount. The mass of the precipitate reveals how much of the analyte was present.

Questions

1. In gravimetric analysis, why is the precipitate heated?

A) To speed up weighing
B) To remove water and reach constant mass
C) To dissolve the sample
D) To increase precipitate mass

2. If you weigh the precipitate while still hot, what error occurs?

A) Result is too low
B) Result is too high
C) No error
D) Balanced error

3. Gravimetry assumes the precipitate is

A) Partially soluble
B) Pure and stoichiometric
C) Decomposing
D) Hydrated

4. What is 'constant mass' in gravimetry?

A) The initial sample mass
B) Sequential weighings differing by <0.5 mg
C) The maximum weight possible
D) The molar mass

5. A 0.5 g sample containing BaCl is precipitated as BaSO (Molar mass = 233 g/mol). The dried precipitate weighs 0.233 g. Find the % BaCl in the sample.

6. Silver is determined gravimetrically by precipitating as AgCl. If 1.0 g of sample gives 0.144 g AgCl precipitate (Molar mass AgCl = 144 g/mol), what is the mass of Ag?

7. A limestone sample (0.8 g) is dissolved and CO is precipitated as CaCO (Molar mass = 100 g/mol). Precipitate mass = 0.160 g. Find % CaCO.

8. Define: What is gravimetric analysis?

9. Define: Why is drying important in gravimetry?

10. Define: What is a desiccator used for?

Answer Key

1. B) To remove water and reach constant mass - Heating at constant temperature removes water and ensures the mass is due only to the analyte compound.

2. B) Result is too high - Hot precipitate has lower density appears to weigh less on the balance. Must cool first.

3. B) Pure and stoichiometric - The purity and known formula of the precipitate are key to calculating the original analyte.

4. B) Sequential weighings differing by <0.5 mg - Constant mass confirms all water is removed and the residue is stable for accurate measurement.

5. Moles of BaSO = 0.233 g / 233 g/mol = 0.001 mol From stoichiometry: 1 mol Ba 1 mol BaSO Moles of Ba = 0.001 mol Moles of BaCl = 0.001 mol Mass of BaCl = 0.001 208 = 0.208 g % BaCl = (0.208 / 0.5) 100 = 41.6%

6. Moles of AgCl = 0.144 g / 144 g/mol = 0.001 mol From equation: 1 mol Ag 1 mol AgCl Moles of Ag = 0.001 mol Mass of Ag = 0.001 108 = 0.108 g

7. Moles of CaCO = 0.160 / 100 = 0.0016 mol Mass of CaCO = 0.0016 100 = 0.160 g % CaCO = (0.160 / 0.8) 100 = 20%

8. A quantitative method isolating an analyte as an insoluble compound, filtering, drying and weighing it.

9. To remove water and ensure only the analyte precipitate is weighed for accurate results.

10. Cooling the hot precipitate to room temperature without it reabsorbing atmospheric moisture.