

Lecture 3

Gravimetry

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Types of Gravimetric Methods

1. Particulate Methods
2. Volatilization Methods
3. Electrogravimetric Methods
4. Precipitation Methods

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Steps Common to All Gravimetric Precipitation Methods

1. Preparation of the solution of the analyte
2. Precipitation
3. Digestion
4. Filtration
5. Washing
6. Drying or ignition
7. Weighing
8. Calculation

Properties of Precipitates and Precipitants

⇒ Give a product with the following characteristics:

- readily filtered and washed free of contaminants
- low solubility
- unreactive with constituents of the atm
- high purity and known composition after drying or ignition

What Factors Determine Particle Size?

- ⇒ *mechanism* of ppt formation is still *not fully understood*
- ⇒ influenced by experimental variables such as ppt solubility, temperature, reactant concentrations, and rate at which reactants are mixed

Why Are Colloids Stable?

⇒ all particles present are either (+) or (-) charged

⇒ the charge structures *repel* each other since they are similarly charged

Heating the Solution

⇒ ↓ [] of ions in primary layer

⇒ ↑ kinetic energy may be sufficient to overcome electrostatic repulsion

∴ colloidal suspensions can often be coagulated by heating, stirring, and adding an electrolyte

Surface Adsorption

- ⇒ normally soluble compound is carried out of solution on the surface of colloid
- ⇒ usually consists of the 1^o and the counter-ion layer
- ⇒ can be minimized by digestion or reprecipitation

Calculations: Gravimetric Factor

Concerned with 2 Measurements

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1. Mass of sample
2. Mass of product of known composition
stoichiometrically related to the analyte

Problems

3. A 0.6407 g sample containing chloride and iodide ions gave a silver halide precipitate weighing 0.4430 g. This precipitate was then strongly heated in a stream of Cl_2 gas to convert the AgI to AgCl ; on completion of this treatment, the precipitate weighed 0.3181 g. Calculate the percentage chloride and iodide in the sample.
4. A sample of impure iron ore is believed to be approximately 55% w/w Fe. The amount of Fe in the sample is to be determined gravimetrically by isolating it as Fe_2O_3 . How many grams of the sample should be taken to ensure that approximately 1 g of Fe_2O_3 will be isolated?