

# Lec 7

## Gravimetric Methods of Analysis

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# Gravimetric methods

Selective precipitation of the analyte and non-selective measurement of mass of the precipitate (classical method)

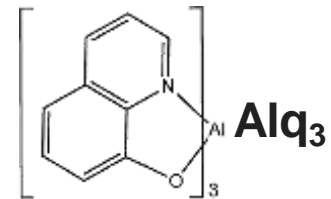
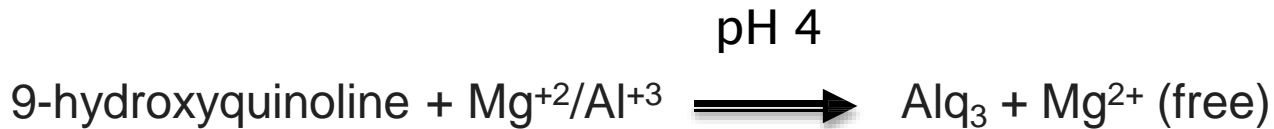
## Steps in Gravimetric analysis

- Solution Preparation (volume, pH, concentration)
- Precipitation (Formation mechanism, Crystal Size)
- Digestion of Precipitate
- Filtration
- Washing
- Drying/Ignition
- Calculations

# 1. Solution Preparation (volume, pH, concentration)

hydroxyquinoline (oxine) can be made selective by pH Adjustment

**Aluminium ions can be easily precipitated at pH 4.**



## 2. Precipitation

**Precipitate Process** It requires addition of a **precipitating agent** solution to the sample solution

**Supersaturation** :The solutions contains more soluble substances than what exists under equilibrium conditions.

**Nucleation**: Few particle/molecules come together to form nuclei (microscopic clusters of atoms or ion) of solid phase.

**Growth**: The nuclei then grow by addition of other precipitate particles and form a certain shape particles.

## Desired Properties of Precipitate

- Insoluble
- Physical Form such that readily separated, washed, free of impurity
- Can be converted to Pure substance of definite chemical composition

### 3. Digestion of the precipitate:

Digestion involves dissolution of small particles and re-precipitation on larger ones resulting in **particle growth** and better precipitate characteristics

#### **4. Washing and Filtering the Precipitate**

Wash the precipitate thoroughly to remove all adsorbed species that would add to the weight of the precipitate.

#### **5. Drying and Ignition:**

The purpose of drying (heating at about 120-150 °C in an oven) or ignition in a muffle furnace at temperatures ranging from 600-1200 °C is to get a material with exactly known chemical structure so that the amount of analyte can be accurately determined.

# Spectroscopy

is the study of the interaction between electromagnetic radiation and matter. The matter can be atoms, molecules or ions.

**Spectrometer** is something which can be used to measure the presence of particular compound or particle in a molecule

## Types of spectroscopy

1. absorption spectroscopy
2. scattering spectroscopy
3. emission spectroscopy

## Beer's law:

It states that the intensity of transmitted monochromatic light decreases exponentially as the **concentration of the absorbing substance increases**

## Spectrophotometer

that measures the amount of light absorbed by a sample.

used to measure the concentration of solutes in solution by measuring the amount of the light that is absorbed by the solution in a cuvette placed in the spectrophotometer