GRAVIMETRIC ANALYSIS

Gravimetric methods are quantitative methods that are based on measuring the mass of a pure compound to which the analyte is chemically related. Since weight can be measured with greater accuracy than almost any other fundamental property, gravimetric analysis is potentially one of the most accurate classes of analytical methods. However it is lengthy and tedious as a result, only a very few gravimetric methods are currently used.

There are three fundamental types of gravimetric analysis.

➢ In precipitation gravimetry, which is our subject in this unit, the analyte is separated from a solution of the sample as a precipitate and is converted to a compound of known composition that can be weighed.

➢ In volatilization gravimetry, the analyte is separated from other constituents of a sample by conversion to a gas. The weight of this gas then serves as a measure of the analyte concentration.

➢ In electrogravimetry, the analyte is separated by deposition on an electrode by an electrical current. The mass of this product then provides a measure of the analyte concentration.

In precipitation gravimetry, the analyte is converted to a sparingly soluble precipitate. This precipitate is then filtered, washed free of impurities, converted to a product of known composition by suitable heat treatment, and weighed. For example, a precipitation method for determining calcium in natural waters involves the addition of CO^{2-} as a precipitating agent :

$$Ca^{2+} (aq) + CO^{2-} (aq) \rightarrow CaCO_4 (s)$$

The precipitate CaC_2O_4 is filtered, then dried and ignited to convert it entirely to calcium oxide:

$$CaC_2O_4 (s) \rightarrow CaO (s) + CO (g) + CO_2(g)$$

After cooling, the precipitate is weighed, and the calcium content of the sample is then computed.

ADVANTAGES

- To measure the purity.

- Most accurate analytical technique.
- It is an ABSOLUTE method.
- Precise methods of macro quantitative analysis.
- Possible sources of errors can be checked.