



how much is uncertain, how many figures say so, and what a reaction actually yields

Analysis

- analytical chemistry separates, identifies, quantifies what a sample is made of
- qualitative analysis: what is present; quantitative: how much of it
- semi-microanalysis works on a few grams of sample, not the whole bulk
- qualitative analysis: dry method (sample untouched) or wet method (sample dissolved)
- classical qualitative methods: precipitation, extraction, distillation, and differences in colour, odour, melting or boiling point
- gravimetric analysis: based on a decomposition reaction
- volumetric (titrimetric) analysis: a reaction run to completion between two solutions
- semi-micro qualitative analysis of an inorganic compound: detects and confirms cations, anions
- of an organic compound: checks for C, H, O, N, S, halogen, P

Why Analytical Chemistry Matters

- monitors raw materials, intermediates, finished products, and air quality of industrial premises
- in agriculture it tests the composition of soils and fertilizers; in medicine, of medicinal preparations
- its applications reach forensic science, engineering and industry, closely tied to the production of new materials
- the field has two arms: classical wet chemical methods, and modern instrumental methods

Errors and Accuracy *

Accuracy



the hits scatter around the bullseye: right on average, even though no single shot lands exactly on it

- how close a measured value sits to the true, accepted value
- set by the sensitivity, the least count, of the instrument used

Precision



the hits cluster tightly together, but off the bullseye: repeatable, not necessarily right

- how closely repeated readings of the same quantity agree with each other
- high precision is needed before high accuracy is even possible

absolute error = observed value minus true value. Relative error = (absolute error divided by true value), times 100%.

Absolute deviation = the size (modulus) of observed value minus the mean of several readings, so it is never negative.

Mean absolute deviation = the mean of those absolute deviations. Relative deviation = (mean absolute deviation divided by the mean), times 100%

