

# Analytical chemistry

Analytical chemistry is a field of chemistry that deals with the chemical composition of the substances.

## We distinguish two types:

- Qualitative analytical chemistry
- Quantitative analytical chemistry

## Qualitative Analytical Chemistry

Qualitative analytical chemistry determines what elements or compounds the investigated substance contains.

- According to the amount of analyzed substance, we distinguish:

1. makroanalysis  $> 0,1 \text{ g}$ ;  $> 10 \text{ cm}^3$
2. semimikroanalysis  $0,01\text{--}0,1 \text{ g}$ ;  $1\text{--}10 \text{ cm}^3$
3. mikroanalysis  $0,001\text{--}0,01 \text{ g}$ ;  $0,1\text{--}1 \text{ cm}^3$
4. ultramikroanalysis  $< 0,001 \text{ g}$ ;  $< 0,1 \text{ cm}^3$

## Method:

1. sampling – selection of representative sample (výběr reprezentativního vzorku)
2. sample adjustment – separation methods (filtration, extraction, distillation, crystallisation)
3. own analysis
4. evaluation

## Dry Road Analysis

In the dry path analysis, the sample is not converted into a solution. This is a tentative - preliminary assessment. We assess the appearance, color, hardness and shape of the crystals.

## Flame tests

Flame tests are based on the fact that certain elements characteristically color the non-luminous flame of the burner. First the platinum wire is annealed and moistened in HCl. When the sample is captured and placed in a non-luminous flame.

cation	Coloring
$\text{K}^+$	pink-purple
$\text{Na}^+$	yellow
$\text{Ba}^{2+}$	green
$\text{Cu}^{2+}$	blue-green
$\text{Ca}^{2+}$	brick red
$\text{Sr}^{2+}$	crimson red

## Annealing on the charcoal

Put a sample in a hole in the charcoal and blow hot air on it with a blower. If it is a metal, a ball is formed and a so-called bead occurs.

## Borax Beads

The method is based on the fact that the white crystalline substance borax (sodium tetraborate) reacts with certain metals to form characteristically colored compounds. We catch a sample of borax on a wire with an eyelet and place it in a non-luminous flame. A borax bead is formed, which becomes characteristically colored.

## Wet road analysis

When we analyze on a wet road, the sample is transferred into a solution. This is a more accurate method than dry path analysis. We use various reagents on the sample which react with the substance and provide colored solutions or precipitates. First we prove the cations, then the anions. We use reagents for evidence of:

1. group – provide a precipitate or solution of a characteristic color with a certain group of ions;
2. selective – provide a certain reaction with a smaller group of ions;
3. specific – react only with one ion.

# Quantitative Analytical Chemistry

Quantitative analytical chemistry determines the amount of elements or compounds in the examined substance.

## Method:

1. preparation of the sample for the determination
2. self determination (precipitation)
3. evaluation (calculations)

## Gravimetry

Gravimetry, or gravity analysis is a very accurate but extremely time-consuming method. At first, the sample is converted into a precipitate and then adjusted into a weighable form (filtration, drying).

## Volumetrics

Volumetrics or volumetric analysis, is a faster but less accurate method. The reaction is based on the reaction between the determined substance and the measuring agent. The result is determined subjectively (using the change in the color of the indicator) or objectively (using devices).

## Instrumental analysis

Instrumental analysis is a method using instruments. This is a very accurate method.

- Chromatografy
- Potenciometry
- Polarimetry

## Links

### Related articles

- Qualitative analysis of elements important from the point of view of biology and toxicology
- Chromatografy
- Polarimetry

### References

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