

Test for Sulphate Radical



General Aim

Test for the presence of sulphate salts.

Method

Physical properties, solubility, reaction with HCl, confirmatory tests.

Learning Objectives (ILOs)

- Recognize sulphate salts in powder form or solution.
- Apply the principles of safety measures.
- Differentiate between thiosulphate and sulphate.

Theoretical Background/Context

- **Qualitative chemical analysis**, branch of chemistry that deals with the identification of elements or grouping of elements present in a sample. The techniques employed in qualitative analysis vary in complexity, depending on the nature of the sample. In some cases, it is necessary only to verify the presence of certain elements or groups for which specific tests applicable directly to the sample (e.g., flame tests, spot tests) may be available. More often the sample is a complex mixture, and a systematic analysis must be made in order that all the constituents may be identified. It is customary to classify the methods into two classes: qualitative inorganic analysis and qualitative organic analysis.
- Sample is commonly dissolved in water for the determination of anionic constituents (i.e., negatively charged elements or groupings of elements) and cationic constituents (i.e., positively charged elements or groupings of elements). The procedure followed is based on the principle of treating the solution with a succession of reagents so that each reagent separates a group of constituents. The groups are then treated successively with reagents that divide a large group into subgroups or separate the constituents singly. When a constituent has been separated it is further examined to confirm its presence and to establish the amount present (quantitative analysis). Portions of the material are dissolved separately, and different procedures are used for each to detect the cationic and anionic constituents.
- Qualitative analysis has applications in different fields especially the production of food, water, pesticides, petrochemicals, and pharmaceuticals.
- Sulfate is one of the major dissolved components of rain. High concentrations of sulfate in the water we drink can have a laxative effect when combined with calcium and magnesium, the two most common constituents of hardness. Bacteria, which attack and reduce sulfates, form hydrogen sulfide gas (H_2S).

Principle of Work

- The purpose of the experiment is the identification of sulphate through the following steps:
 - 1) Physical examination.
 - 2) Solubility testing.
 - 3) Reaction with barium chloride.
 - 4) Confirmatory test with silver nitrate.
 - 5) Confirmatory test with lead acetate.
 - 6) Confirmatory test with mercuric nitrate.