

Element Analysis

Element analysis is a process where a sample is analyzed for its elemental composition.

Elemental analysis can be

- 1- Qualitative determining what elements are present
- 2- Quantitative determining how much of each element is present

Qualitative elemental analysis

The chief making up organic compounds are carbon hydrogen and oxygen for which the organic chemist do not employ chemical tests. It is often valuable to determine the existence of other elements next in importance such as nitrogen, halogens and sulfur.

Sodium element :

- 1- It's a dangerous highly reactive metal, so extreme care should be exercised when handling it since it can react vigorously and exothermically with water , to the point that sufficiently large pieces melt to a sphere and may explode; this reaction produces caustic soda (sodium hydroxide) and flammable hydrogen gas.



- 2- Therefore sodium element is kept dipped in liquid paraffin to prevent exposure to moisture. The paraffin should be wiped off before using the sodium. It is also advised not to touch it directly by hands since hands are usually moist resulting in burning sensation.
- 3- Because of its high reactivity , sodium metal is never found as a pure element in nature so it must be prepared from its compounds.
- 4- Sodium at standard temperature and pressure is a soft silvery shiny element that oxidizes to grayish white non shiny when it's exposed to air.

Name of experiment : Qualitative Elemental Analysis

Aim of experiment:

Organic compound identification by the detection of the presence of elements as nitrogen, sulfur & halogens in our unknown sample

Procedure :**A- Sodium fusion :**

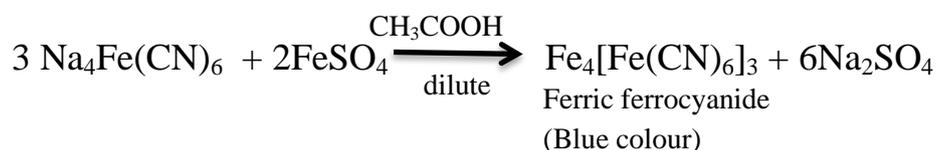
- 1- A sample quantity of the known is placed in a clean, dry test tube together with a small piece of Na metal.
- 2- The test tube is held vertically by a clamp.
- 3- The lower part of the tube is heated gradually until the Na melts & its vapours fill the lower part of the tube.
- 4- Heating is then continued for additional 5 minutes until the bottom of test tube becomes red
- 5- To remove the excess unreacted Na add a small quantity of alcohol (ethanol) to the test tube with heating so that the alcohol will react with the excess Na to give sodium alkoxide.

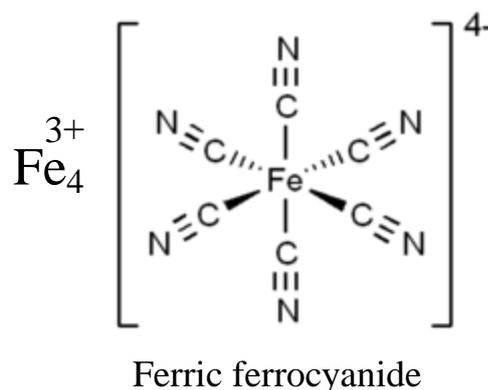
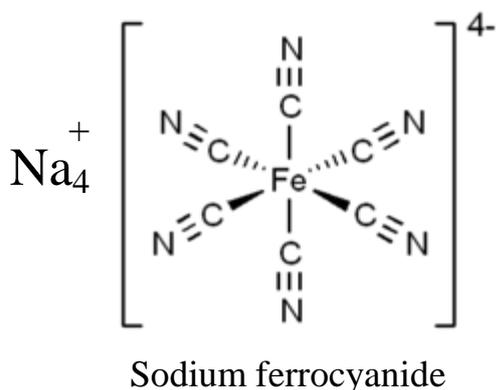


- 6- Cautiously drop the still hot test tube into a beaker containing about 20 ml of distilled water.
- 7- The tube will break down &, if not, use a glass rode to break it
- 8- The resulting solution is heated to boiling & filtered.
- 9- The filtrate should be colorless, is used for specific tests.

B- Specific test for elements**Detection of nitrogen**

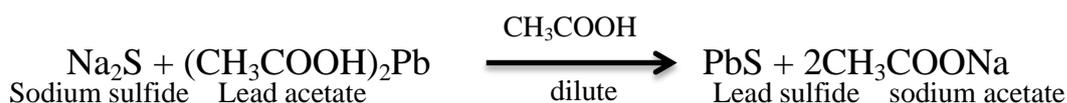
- 1- To a 3 ml of the filtrate add 4 drops of ferrous sulfate solution (FeSO_4)
- 2- Check the basicity of the solution and make it basic by the addition of enough NaOH or KOH solution (10%).
- 3- Heat for boiling
- 4- Now add drops of dilute sulfuric acid (H_2SO_4) enough to make the solution acidic.
- 5- A Prussian blue precipitate indicates a positive test of N





Detection of sulfur

- 1- Acidify 2 ml of the filtrate with dilute acetic acid (red colour to litmus paper)
- 2- Add 5 drops of lead acetate solution. A black precipitate of lead sulfide indicates the presence of sulfur.



Acetic acid is used in the acidification and not other acid (sulfuric, hydrochloric or nitric acid) since they give insoluble white precipitate through reaction with lead acetate.



Detection of halogens

In case of presence of nitrogen and sulfur in the compound

- 1- Acidify 3 ml of the filtrate with dilute nitric acid (add drop by drop until the solution becomes acidic)
- 2- Boil for 5 min & then add drops of silver nitrate. White or yellow precipitate indicates the presence of halogens.

