



**Al-Mustaqbal University**  
**College of Science**



# **Qualitative Analytical Chemistry**

**First Year Students / 1<sup>st</sup> Lecture**

**Detection of Elements in Organic Compounds**

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*By*

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## Detection of Elements in Organic Compounds [LASSAIGNE`S EXTRACT (SODIUM FUSION EXTRACT)]

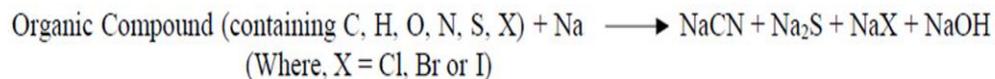
Background:

Detection of elements present in an organic compound constitutes an important step in its analysis. All the organic compounds contain carbon. Hydrogen is also present in most of the organic compounds (the few exceptions are the compounds such as  $\text{CCl}_4$ ,  $\text{CS}_2$ , etc.). In addition to carbon and hydrogen other elements which are generally present in organic compounds are oxygen, nitrogen, sulphur and halogens.

Since nearly all the organic compounds contain carbon as well as hydrogen it is usually not necessary to carry out tests to detect them and their presence can be assumed without testing for them. Here, we shall study the tests for the detection of nitrogen, sulphur and halogens only.

Lassaigne`s extract is prepared for the detection of nitrogen, sulphur, and halogens (Cl, Br, I) in an organic compound. These elements are covalently bonded to the organic compounds. In order to detect them, these have to be converted into their ionic forms. This is done by fusing the organic compound with sodium metal (Na). The ionic

compo  
detecte



be  
fusion

extract or Lassaigne's extract.

**Test for nitrogen:** The carbon and nitrogen present in the organic compound on fusion with sodium metal give sodium cyanide (NaCN) soluble in water. This is converted into sodium ferrocyanide by the addition of sufficient quantity of ferrous sulphate. Ferric ions generated during the process react with ferrocyanide to form blue precipitate of ferric ferrocyanide.

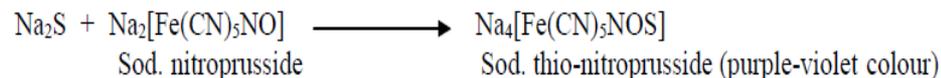


Sodium ferrocyanide



Ferric ferrocyanide

**Test for sulphur:** If sulphur is present in the organic compound, sodium fusion will convert it into sodium sulphide. Sulphide ions are readily identified using sodium nitroprusside appearance of a deep violet colour indicates sulphur.



Sod. nitroprusside

Sod. thio-nitroprusside (purple-violet colour)

The presence of sulphur can also be identified by appearance of black precipitate (lead sulphide) after the addition of lead acetate.



**Test for both Nitrogen & Sulphur together:**

If both N & S are present in the sample, then sodium thiocyanate (NaSCN) is formed with sodium (ionic form of nitrogen and sulphur together in the extract). Sodium thiocyanate

(NaSCN) reacts with ferric chloride to give ferric thiocyanate, a blood red colour complex. Thus, the appearance of blood red colour indicates the presence of nitrogen and sulphur together.



**Test for halogens (Cl, Br, I):** Halogens (X) react with Na to form sodium halide (NaX). The sodium halide (NaX) is reacted with silver nitrate ( $\text{AgNO}_3$ ) to give precipitate of silver halide ( $\text{AgX}$ ). A white precipitate ( $\text{AgCl}$ ) soluble in ammonium hydroxide indicates the presence of chlorine. An off-white precipitate ( $\text{AgBr}$ ) partly soluble in ammonium hydroxide indicates the presence of bromine, while yellow precipitate ( $\text{AgI}$ ) insoluble in ammonium hydroxide indicates the presence of iodine.



**Ignition test:** Burn a small amount of the sample on a metal spatula to know about the aliphatic or aromatic nature of the compound. Luminous flame indicates aliphatic compound while sooty/smoky flame indicates aromatic compound.

<https://www.youtube.com/watch?v=2W2MXhB9hNo>