Chemistry Practical Class 11 Detection of nitrogen, sulphur, chlorine, in the organic compounds Viva Questions with Answers

Q1. What is the Lassaigne's Test?

Answer. Lassaigne's test detects nitrogen, sulphur, and halogens in organic compounds. In a fusion tube with the organic compound, a small piece of Na metal is heated. The basic idea is that Na converts all of the elements present into ionic form.

Q2. Discuss the working principle of Lassaigne's Test.

Answer. Covalent bonds exist between components such as halogens, nitrogen, sulphur and organic compounds.
The components must be changed into their ionic states for identification. The procedure is made possible by the fusion of an organic compound in the presence of sodium metal.

Q3. How sulphur is detected by Lassaigne's test?

Answer. If there is a black precipitate of lead sulphide, it indicates the presence of sulphur. This can be accomplished by adding the clean fusion solution to the diluted Acetic acid, resulting in a lead acetate solution.
Sulphur is represented by a purple pattern when we add 2-3 drops of a freshly prepared dilute solution of sodium pentacyanonitrosyl ferrate $Na_2[Fe(CN)_5NO]$ to the solution.
$S^{2-} + [Fe(CN)_5NO]^{2-} \rightarrow [Fe(CN)_5NOS]^{4-}$.

Q4. How sodium is detected by Lassaigne's test?

Answer. The extract is first acidified with HNO_3 before being treated with $AgNO_3$. A white precipitate that is soluble in NH_4OH indicates the presence of Cl, a yellowish precipitate that is only slightly soluble in NH_4OH indicates the presence of Br, and a yellow precipitate that is insoluble in NH_4OH indicates the presence of I.
$NaX + AgNO_3 \rightarrow NaNO_3 + AgX \downarrow$

Q5. How nitrogen is detected by Lassaigne's test?

Answer. The extract is acidified with concentrated H_2SO_4 after being boiled with $FeSO_4$. The presence of nitrogen is indicated by the appearance of the Prussian blue colour.
The following reactions take place:

- $Fe^{2+} + 6CN– \rightarrow [Fe(CN)_6]^{4-}$

- $Fe^{2+} + H^{+} \rightarrow Fe^{3+} + e^{-}$
- $[Fe(CN)_6]^{4-} + 4Fe^{3+} \rightarrow Fe_4[Fe(CN)_6].H_2O$

Q6. Why is sodium metal kept under kerosene oil?

Answer. The metal sodium reacts with the oxygen and moisture in the air. Kerosene oil protects itself from moisture and oxygen by preventing the contact of air and sodium.

Q7. Why is an organic compound fused with sodium metal in the preparation of Lassaigne's extract?

Answer. When an organic compound is heated with sodium, the elements present in the compound, such as nitrogen, sulphur, and halogens, are converted into sodium salts that are soluble in water. These elements are then identified using the aqueous solution.

Q8. Can we use potassium in place of sodium in Lassaigne's test?

Answer. No. Potassium is a highly reactive metal that should not be used.

Q9. What causes the bluish-green colour in Lassaigne's test for nitrogen?

Answer. It occurs as a result of the formation of ferric ferrocyanide, $Fe_4[(FeCN)_6]_3$.

Q10. During the detection of nitrogen, sometimes a blood-red colour is obtained. What is the reason for this?

Answer. The presence of both N and S in the organic compound is demonstrated by the formation of blood-red colour with $FeCl_3$ solution. It occurs as a result of the formation of $Fe(CNS)_3$.

Q11. Why is a fresh solution of $FeSO_4$ used in the nitrogen test?

Answer. After a long period of time, atmospheric oxygen oxidizes $FeSO_4$ solution to ferric sulphate. As a result, it will not produce the desired result.

Q12. What role does the addition of HCl play in the detection of nitrogen?

Answer. The purpose of adding HCl is to dissolve the green ppt. of $Fe(OH)_2$, otherwise, incorrect inferences may result.

Q13. Why is sodium metal dried prior to fusion?

Answer. It is done to avoid explosions caused by kerosene oil vapours during heating.

Q14. How will you test for sulphur using a lead acetate solution?

Answer. A portion of Lassaigne's extract is acidified with acetic acid and then treated with lead acetate solution. The presence of sulphur is indicated by the formation of black ppt.
$Na_2S + (CH_3COO)_2Pb \rightarrow PbS\downarrow + 2CH_3COONa$

Q15. Why is distilled water used in the preparation of Lassaigne's extract?

Answer. This is due to the presence of chloride ions in tap water, which will result in a precipitate of AgCl with $AgNO_3$ solution even if the organic compound does not contain chlorine.

Q16. Why is the CS_2 layer coloured in the detection of bromine and iodine but not the aqueous layer?

Answer. Because bromine and iodine are more soluble in CS_2, they are used.

Q17. Why is sodium extract naturally alkaline?

Answer. Since the organic compound is fused with sodium metal before being extracted with water Unreacted metal reacts with water, forming an alkaline solution.
$2Na + H_2O \rightarrow 2NaOH + H_2$

Q18. Why is it necessary to dissolve the red hot ignition tube in distilled water?

Answer. All fused salts, such as NaCN, Na_2S, or NaX, are extracted with distilled water.

Q19. What is Beilstein's test?

Answer. This test is used to detect halogens. In this experiment, a copper wire is heated until it no longer imparts a blue colour to the flame. The compound is then heated again after being touched with wire. If it again gives off a blue colour, it indicates the presence of halogen.

Q20. Why is the Beilstein test insufficient for detecting halogens?

Answer. This test does not reveal which halogen is present. Furthermore, many compounds that do not contain any halogens pass this test.