AMITY INTERNATIONAL SCHOOL, NOIDA

EXPERIMENT NO : 4(a) Functional group analysis

Aim – Determine the functional group present in the given organic compound.

Apparatus – Test tube, Test tube holder, Water bath, Gas burner and measuring cylinder etc.

Chemical required – Alcoholic, Phenol, Acetic acid, Sodium metal, Ceric ammonium nitrate, concentrated sulphuric acid, blue and red litmus paper, neutral ferric chloride Sodium bicarbonate, Ethyl alcohol etc.

Observation table

Sample A

Experiment	Observation	Inference
1. To 1 ml sample add Sodium metal	Hydrogen gas evolved with effervesces.	Alcoholic group present
2. To 1 ml sample add Ceric ammonium nitrate.	Orange/red/pink colour obtained	Alcoholic group present
3. **Ester test** To 0.5 ml sample add 1 ml acidic acid, 4 drops of con. Sulphuric acid and heat in water bath. Pour the contents in ice cold water.	A fruity smell/ pleasant odour obtained.	Alcoholic group present

Sample B

Experiment	Observation	Inference
1. Put a drop of sample on blue litmus paper	Litmus paper turned red	Phenolic or carboxylic acid group present
2. To 0.5 ml sample add neural ferric chloride solution.	Blue/violet / colour obtained	Phenolic group present

Sample C

Experiment	Observation	Inference
1. Put a drop of the sample on blue litmus paper	Litmus paper turned red	Phenolic or carboxylic acid group present.
2. To 0.5 ml sample add sodium bicarbonate solution	CO_2 gas with brisk effervesces evolved	Carboxylic acid group present.
3. To 0.5 ml sample add 1 ml ethyl alcohol, 4 drops of conc. Sulphuric acid and heat the mixture in water bath. Transfer the contents in ice cold water.	A fruity smell/ pleasant odour	Carboxylic acid group present.

Result – The functional group present in the given organic compound is
Sample A : Alcohol
Sample B : Phenol
Sample C : Carboxylic Acid

Precautions-

1. Always use clean and dry test tube to perform the test.
2. Phenol is highly corrosive to skin and should be handled with care.
2. Use test tube holder to hold the test tube.
3. Always heat the test tube in water bath.

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EXPERIMENT NO : 4(b) Functional group analysis

Aim – Determine the functional group present in the given organic compound.

Apparatus – Test tube, Test tube holder, Water bath, Gas burner and measuring cylinder etc.

Chemical required - Aldehyde, Acetone, Aniline, Fehling's solution, Tollen's reagent, 2-4 DNP, Sodium bisulphite, Sodium hydroxide, Sodium nitroprusside, m-dinitrobenzene, alcoholic KOH, chloroform, Sodium nitrite, concentrated HCl and β – naphthol.

Observation table

Sample D

Experiment	Observation	Inference
1. To 0.5 ml sample add 2-4 DNP and wait for 5 minutes	Appearance of Yellow ppt.	Carbonyl group present
2. To 0.5 ml sample, add Sodium bisulphite solution and wait for 5 minutes.	A crystalline white ppt obtained.	Carbonyl group present
3. To 0.5 ml sample add equal amounts of Fehling's A solution and Fehling's B solution. Heat the mixture in water bath.	Orange/red ppt obtained	Aldehyde group present
4. To 0.5 ml sample, add Toller's reagent and heat the solution in water bath for 5 to 10 min.	A shining mirror obtained due to the deposition of silver	Aldehyde group present

Sample E

Experiment	Observation	Inference
1. To 0.5 ml sample add 2-4 DNP and wait for 5 minutes	Appearance of Yellow ppt.	Carbonyl group present
2. To 0.5 ml sample, add Sodium bisulphite solution and wait for 5 minutes.	A crystalline white ppt obtained.	Carbonyl group present
3. To 0.5 ml sample add sodium nitroprusside solution followed by NaOH solution.	Red colour obtained	Ketonic group present
4. To 0.5 ml sample add m-dinitrobenzene followed by NaOH solution.	Voilet/purple colour obtained	Ketonic group present

Sample F

Experiment	Observation	Inference
1. Put a drop of sample on red litmus paper	Paper turned blue	Amine group is present.
2. **Carbylamine test** To 0.5 ml sample add alcoholic KOH followed by 4 drop of chloroform and heat the mixture in water bath.	Unpleasant odour due to isocyanide occurred	Primary amine present.
3. **Azo- dye test** - Test tube no. 1 : Sodium nitrite dissolved in water in. Test tube no 2 : β- naphthol dissolved in NaOH Test tube no 3 : In 0.5 ml aniline sample add conc. Hydrochloric acid. Cool all three test tubes in ice cold water and add contents of test tube 1 to 2 and then add 3 to mixture.	A orange red dye obtained.	Primary aromatic amine is present.

Result – The functional group present in the given organic compound is
Sample D : Aldehyde
Sample E : Ketone
Sample F : Primary amine

Precautions-

1. Always use clean and dry test tube to perform the test.
2. Use test tube holder to hold the test tube.
3. Take small quantity of sample of organic compound to perform the test.
4 Always heat the test tube in water bath.