

(Deemed to be University)
(Established Under Section 3 of UGC Act 1956)
Coimbatore – 641 021.

SYLLABUS

DEPARTMENT OF CHEMISTRY

STAFF NAME: Dr. A. THANGAMANI

SUBJECT NAME: CHEMISTRY PRACTICAL-I SUB.CODE:18BTU113

SEMESTER: I CLASS: I B.Sc (BIOTECHNOLOGY)

18BTU113 CHEMISTRY PRACTICAL-I 3H-2C

Instruction Hours/week: L:0 T:0 P:3 Marks: Internal:40 External: 60 Total:100

Course Objective

To make the student able to identify the elements and the functional groups present in an organic compound.

Course Outcome

On successful completion of the course the students should have

- 1. Learnt about the qualitative analysis of organic compounds.
- 2. Learnt the detection of elements and functional groups present in an organic compound by systematic analysis.

Systematic analysis of an organic compound

- > Preliminary tests
- > Detection of elements present
- > Aromatic or aliphatic
- > Saturated or unsaturated
- Nature of the functional group,
- Confirmatory tests— aldehydes, ketones, amines, amides, diamide, carbohydrates, phenols, acids, esters & nitro compounds.

Note: Each student should analyse minimum 6 compounds.

References:

- 1. Thomas, A.O. (2012). *Practical Chemistry for B.Sc. Main Students*. Cannanore: Kerala, Scientific Book Centre.
- 2. Ramasamy, R. (2011). Allied Chemistry Practical Book. Karur: Priya Publications.
- 3. Venkateswaran, V., Veeraswamy, R., & Kulandaivelu, A. R. (2015). *Basic Principles of Practical Chemistry* (2nd ed.). New Delhi: S. Chand Publications.



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LECTURE PLAN DEPARTMENT OF CHEMISTRY

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S.No.	Lecture Duration Period	Topics to be Covered	Support Material/Page Nos
1	3	General discussion about practicals, Issuing apparatus and safety procedure to be followed in the laboratory	
2	3	Writing the experimental procedure	
3	3	Demonstration for systematic analysis of organic compound	R1:369-386 R2:48-54
4	3	Systematic analysis of organic compound–I	R1:369-386 R2:48-54
5	3	Systematic analysis of organic compound-II	R1:369-386 R2:48-54
6	3	Systematic analysis of organic compound-III	R1:369-386 R2:48-54
7	3	Viva-voce questions discussion	R1:527-531
8	3	Systematic analysis of organic compound-IV	R1:369-386 R2:48-54
9	3	Systematic analysis of organic compound-V	R1:369-386 R2:48-54
10	3	Systematic analysis of organic compound-VI	R1:369-386 R2:48-54
11	3	Revision	
12	3	Model Practical Examination	
	Total No. of H	ours Planned For Practical's $= 36$	

References:

R1.Thomas, A.O. (2012). *Practical Chemistry for B.Sc. Main Students*. Cannanore: Kerala, Scientific Book Centre.

R2. Ramasamy, R. (2011). Allied Chemistry Practical Book. Karur: Priya Publications.



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DEPARTMENT OF CHEMISTRY

Name of the Staff : **Dr. A. THANGAMANI**

Department : Chemistry

Title of the Paper : CHEMISTRY PRACTICAL-I

Paper Code : **18BTU113**

Class : I-B. Sc-Biotechnology

Year and Semester : I-Year (2018) and I-Semester

Batch : 2018-19

LIST OF EXPERIMENTS

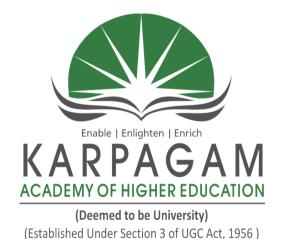
- 1. Analysis of organic compound -I
- 2. Analysis of organic compound -II
- 3. Analysis of organic compound -III
- 4. Analysis of organic compound -IV
- 5. Analysis of organic compound -V
- 6. Analysis of organic compound -VI

A Laboratory Manual on

QUALITATIVE ANALYSIS OF ORGANIC COMPOUNDS

Dr. A. Thangamani & Dr. K. Sundaram

Department of Chemistry



KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)
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CLASS: I-B.Sc., BIOTECHNOLOGY COURSE NAME: CHEMISTRY PRACTICAL-I COURSE CODE: 18BTU113 Qualitative Analysis of Organic Compounds BATCH-2018-2021

QUALITATIVE ANALYSIS OF ORGANIC COMPOUNDS

Compounds given for organic analysis

S. No.	Compound	Nature	Nitrogen	Aromatic or Aliphatic	Saturated or Unsaturated	Functional Group
1.	Benzoic acid	Colourless solid	Absent	Aromatic	Saturated	Monocarboxylic acid
2.	Phthalic acid	Colourless solid	Absent	Aromatic	Saturated	Dicarboxylic acid
3.	Cinnamic acid	Colourless solid	Absent	Aromatic	Unsaturated	Monocarboxylic acid
4.	Benzamide	Colourless solid	Present	Aromatic	Saturated	Amide
5.	Urea	Colourless solid	Present	Aliphatic	Saturated	Diamide
6.	Glucose	Colourless solid	Absent	Aliphatic	Saturated	Carbohydrate
7.	Phenol	Colourless liquid	Absent	Aromatic	Saturated	Phenol
8.	Aniline	Pale brown liquid	Present	Aromatic	Saturated	Amine
9.	Benzaldehyde	Colourless liquid	Absent	Aromatic	Saturated	Aldehyde
10.	Acetophenone	Colourless liquid	Absent	Aromatic	Saturated	Ketone



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QUALITATIVE ANALYSIS OF ORGANIC COMPOUND

GENERAL PROCEDURE

S. No.	Experiment	Observation	Inference
	I. Preliminary test		
1.	Colour and appearance Colour and appearance of the substance is noted.	a) Brown or dark coloured solid or liquid	a) May be aromatic amines or phenols
		b) Colourless liquid c) Colourless solid	b) May be aldehyde or ketonec) May be acids or amides or carbohydrates
2.	Odour of the substance Odour of the given substance is noted.	a) Phenolic smell	a) May be phenols
		b) Aniline like smell	b) May be aromatic amine (aniline)
		c) Odour of almond	c) May be aldehyde
		d) Pleasant odour	d) May be ketone
		e) No characteristic odour	e) Absence of amine, phenols, aldehyde and ketone.
3.	Solubility test Solubility of the given organic substance is tested in the following solvents.		
	a) In water	a) Soluble in the cold condition	a) May be carbohydrates or diamide like urea
		b) Soluble in the hot condition	b) May be aromatic acids or amides
	b) In dilute hydrochloric acid	a) Solubleb) Insoluble	a) May be aromatic amine (aniline)b) Absence of aromatic
4	Duan quation of the self-	,	amine (aniline)
4.	A piece of dry sodium met the substance is added and the then heated to redness. The re water in a mortar. The content The filtrate is called sodium fu	ral is fused well in an igni e tube is heated gently un ed hot end of the tube is p ts are ground well, boiled	olunged in 10 ml of distilled in a china dish and filtered.



S. No.	Experiment	Observation	Inference
	a) Test for nitrogen		
	To about 2 ml of the extract a strong solution of freshly prepared ferrous sulphate is	a) Blue or green precipitate or solution is obtained	a) Presence of nitrogen
	added. The solution is boiled, cooled and then dilute hydrochloric acid is added.	b) No blue or green precipitate or solution is obtained	b) Absence of nitrogen
	b) Test for sulphur To about 1 ml of the extract 1 or 2 drops of freshly	a) Violet colouration	a) Presence of sulphur
	prepared sodium nitroprusside solution is added.	b) No violet colouration	b) Absence of sulphur
	c) Test for halogens		a) Presence of chlorine
	To about 1 ml of the extract added 1 or 2 drops of dilute nitric acid and 1 or 2 drops of silver nitrate solution is added.	a) Curdy white precipitate soluble in ammonium hydroxideb) Pale yellow precipitate sparingly	b) Presence of bromine
		soluble in ammonium hydroxide c)Yellow precipitate insoluble in ammonium	c) Presence of Iodine
		hydroxide d) No precipitate	d) Absence of halogens
5.	Test for aliphatic or aromatic	c character	1
	a) Ignition test		
	A little of the substance is burnt in a nickel spatula.	a) Burns with a luminous smoky flame	a) Presence of aromatic compound
		b) Burns with a non- luminous flame	b) Presence of aliphatic compound



S. No.	Experiment	Observation	Inference
	b) Nitration test		
	A little of the substance is heated with 1 ml of conc. nitric acid and 1 ml of conc. sulphuric in a test tube and	a) Yellow precipitate or solution is obtained	a) Presence of aromatic compound
	poured into cold water in a beaker.	b) No yellow precipitate or solution is obtained	b) Presence of aliphatic compound
6.	Test for saturation or unsatu	ration	
	a) Bromine—water test A little of the substance is shaken up with 1 ml of water and bromine water is added	a) Decolourisation takes place readily	a) Presence of unsaturated compound
	drop by drop.	b) Decolourisation takes place with the formation of a white precipitate	b) Presence of saturated compounds like amines or phenols
		c) No decolourisation takes place readily	c) Presence of saturated compound
	b)Potassium permanganate test A little of the substance is treated with a dilute solution of potassium permanganate.	a) Decolourisation takes place readilyb) No decolourisation	a) Presence of unsaturated compound or easily oxidisable compounds like phenols or amines or aldehydes b) Presence of saturated
		takes place readily	compound
7.	Sodium carbonate test A little of the substance is added to 1 ml of a strong solution of sodium carbonate.	a) Vigorous effervescence takes place evolving carbon dioxide gas b) No vigorous	a) Presence of acidsb) Absence of acids
		effervescence takes place	
8.	Sodium hydroxide test: To a little of the substance about 2 ml of 10% sodium hydroxide solution is added and boiled gently.	a) Dissolves readily in the cold condition and the substance is regenerated on adding dilute hydrochloric acid b) Solution turns	a) Presence of acids b) May be carbohydrates
		yellow or brown on boiling	,,



S. No.	Experiment	Observation	Inference
		c) On heating ammonia gas is evolved. It gives dense white fumes with a glass rod dipped in conc. hydrochloric acid	c) May be amides
9.	A little of the substance is heated with powdered soda lime and heated strongly.	a) Ammonia gas is evolved b) No ammonia gas is evolved	a) May be amidesb) Absence of amides
10.	Conc. sulphuric acid test A little of the substance is treated with 2 ml of conc. sulphuric acid and warmed.	a) The substance chars with smell of burnt sugarb) No characteristic	a) May be carbohydrates b) Absence of
11.	Neutral FeCl ₃ test To a little of the substance dissolved in water or alcohol, about 2 ml of neutral ferric chloride is added.	change a) Violet or blue or green colour is obtained b) No violet or blue or green colour is obtained	carbohydrates a) Presence of phenol b) Absence of phenol
	If the substance does not conta		tests are conducted.
	II. Test for functional groups		
1.	Test for acids a) Ester test A little of the substance is mixed with a few drops of alcohol and 2 drops of conc. sulphuric acid. The	1	a) Presence of carboxylic acid
	mixture is gently warmed and poured into a beaker containing dilute sodium carbonate solution. b) Phenolphthalein test	b) No fruity odour is noted	b) Absence of carboxylic acid
	To about 2 ml of sodium hydroxide solution, 1 drop of dilute phenolphthalein indicator is added pink colour appears. To this, the	a) Pink colour disappears	a) Presence of carboxylic acid
	substance dissolved in water or alcohol is added drop by drop in excess.	b) Pink colour does not disappear	b) Absence of carboxylic acid



S. No.	Experiment	Observation	Inference
	c) Fluorescein test		
	A small amount of the substance is mixed with few drops of resorcinol in a dry test tube. 3 drops of conc.	a) An intense greenish yellow fluorescence is produced	a) Presence of dicarboxylic acid
	sulphuric acid is added. Shake well, boil gently and then pour into 100 ml of cold water taken in a beaker. Stir well and then sodium hydroxide solution is added in drops.	b) No intense greenish yellow fluorescence is produced	b) Presence of monocarboxylic acid
2.	Test for phenols		
	a) Liebermann's reaction A little of the substance is mixed with a few crystals of sodium nitrate and 3 or 4 drops of conc. sulphuric	a) Red solution is obtained. This turns blue or green on adding sodium	a) Presence of phenol
	acid. This is gently warmed and poured into water. To this sodium hydroxide is added and stirred well.	hydroxide solutionb) No red solution is obtained	b) Absence of phenol
	b) Phthalein fusion test A little of the substance is mixed with phthalic anhydride and 1 ml of conc. sulphuric acid and the	a) Pink or red colour is obtained	a) Presence of phenol
	mixture is gently heated and poured into a beaker containing water. To this sodium hydroxide solution is added with stirring. c) Azo-dye test	b) No pink or red colour is obtained	b) Absence of Phenol
	A few drops of aniline is dissolved in about 5 ml of dilute hydrochloric acid. To this 5 ml of a strong solution	a) Scarlet red dye is obtained	a) Presence of phenol
	of sodium nitrate is added in drops with constant shaking and cooling in cold water. To the above solution, a solution of the substance dissolved in 10% sodium hydroxide is added.	b) No scarlet red dye is obtained	b) Absence of phenol
	10% sodium hydroxide is		



S. No.	Experiment	Observation	Inference
3.	Test for carbohydrates a) Molisch's test		
	To a little of the substance in water a few drops of an alcoholic solution of 1-naphthol are added. To this mixture, conc. sulphuric acid is added along the sides of	a) Violet ring is obtained at the junction of the two layers and this spreads slowly	a) Presence of carbohydrate
	the test tube without shaking.	b) No violet ring is obtained	b) Absence of carbohydrate
	b) Tollen's reagent test To a little of the substance add about 2 ml of Tollen's reagent. This is shaken well and heated in a boiling water bath.	a) Black precipitate or bright silver mirror is formedb) No black precipitate or bright silver mirror is formed	a) Presence of carbohydrateb) Absence of carbohydrate
	c) Fehling's test 1 ml of Fehling solution (A) is mixed with 1 ml of Fehling solution (B). The mixture is added to a little of the substance dissolved in	a) Red precipitate is obtained	a) Presence of reducing sugars
	water, shaken well and heated in a boiling water bath.	b) No red precipitate is obtained	b) Absence of reducing sugars
4.	Test for Aldehyde and Ketone		
	a) Schiff's reagent test To a little of the substance Schiff's reagent is added and	a) Violet colour is formed	a) Presence of aromatic aldehyde
	shaken well.	b) No violet colour is formed	b) Absence of aromatic aldehyde
	b) Tollen's reagent test To a little of the substance a few drops of Tollen's reagent	a) Silver mirror is obtained	a) Presence of aldehyde
	is added and kept it in a hot water bath.	b) No silver mirror is obtained	b) Presence of ketone
	c) Legal's test To a little of the substance a few drops of freshly prepared	a) Wine red or blue colour is formed	a) Presence of ketone like acetophenone
	sodium nitroprusside and a few drops of 10% sodium hydroxide is added.	b) No wine red or blue colour is formed	b) Absence of ketone



S. No.	Experiment	Observation	Inference
	d) <i>m</i> -Dinitrobenzene test		
	To a little of the substance a small amount of <i>m</i> -dinitrobenzene and a few	a) Violet or red colour is formed	a) Presence of ketone like acetophenone
	drops of dilute sodium hydroxide is added.	b) No violet or red colour is formed	b) Absence of ketone
	If the substance contains nitrog	gen, the following tests are	conducted.
5.	Test for amides a) Sodium hydroxide test	a) White precipitate is	a) Presence of an aromatic
	A little of the substance is heated with 5 ml of 10% sodium hydroxide solution	obtained	amide
	till no more ammonia is evolved. It is then cooled and acidified with conc. hydrochloric acid.	b) No white precipitate is obtained	b) Presence of an aliphatic amide (urea)
	b) Biuret test		
	A little of the substance is heated in a dry test tube for a few minutes. It is cooled and	a) Violet colour is obtained	a) Presence of a diamide like urea
	the residue is dissolved in 2 ml of water. To this 2 drops of dilute copper sulphate solution are added and then 10% sodium hydroxide solution is added dropwise.	b) No violet colour is obtained	b) Absence of a diamide like urea
	c) Oxalic acid test To a strong aqueous solution of the substance added oxalic acid solution, shaken well.	a) White precipitate is obtained	a) Presence of a diamide like urea
	deld soldton, shaken wen.	b) No white precipitate is obtained	b) Absence of a diamide like urea
6.	Test for amines		
	a) Action on nitrous acid		
	A little of the substance is dissolved in about 3 ml of dilute hydrochloric acid. To this a strong solution of	a) A clear solution is produced	a) Presence of aromatic primary amine (aniline)
	sodium nitrate is added drop wise cooling the mixture in ice cold water.	b) No clear solution is produced	b) Absence of aromatic primary amine (aniline)



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To the clear solution, a	,	
solution of 2-naphthol in	obtained	primary amine (aniline)
sodium hydroxide is added.		
	b) No scarlet red dye is	b) Absence of aromatic
	obtained	primary amine (aniline)

Report:

- 1. Element present
- 2. Aromatic / Aliphatic -
- 3. Saturated / Unsaturated -
- 4. Functional group present -

The given organic compound is



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MODEL ANALYSIS-1 Urea (Diamide)

S. No.	Experiment	Observation	Inference
201100	I. Preliminary test	0 % 3 4 7 W 3 7 1	
1.	Colour and appearance		
••	Colour and appearance	Colourless solid	May be acids or amides or
	of the substance is noted.	C 010 W11 000 0011 W	carbohydrates
2.	Odour of the substance		
	Odour of the given substance	No characteristic odour	Absence of amine, phenols,
	is noted.		aldehyde and ketone.
3.	Solubility test		
	Solubility of the given		
	organic substance is tested in		
	the following solvents.		
	<u> </u>		
	In water	Soluble in the cold	May be carbohydrates or
		condition	diamide like urea
4.	Preparation of the sodium fu	sion extract:	
			ition tube. To this, a little of
	the substance is added and the		
	then heated to redness. The re		
	water in a mortar. The conten		
	The filtrate is called sodium fu		
	a) Test for nitrogen		
	To about 2 ml of the extract a	Green solution is	Presence of nitrogen
	strong solution of freshly	obtained	
	prepared ferrous sulphate is		
	added. The solution is boiled,		
	cooled and then dilute		
	hydrochloric acid is added.		
	b) Test for sulphur		
	To about 1 ml of the extract	No violet colouration	Absence of sulphur
	1 or 2 drops of freshly		
	prepared sodium		
	nitroprusside solution is		
	added.		
	c) Test for halogens		
	To about 1 ml of the extract	No precipitate	Absence of halogens
	added 1 or 2 drops of dilute		
	nitric acid and 1 or 2 drops of		
	nitric acid and 1 or 2 drops of silver nitrate solution is		
	-		



5.	Test for aliphatic or aromatic	c character	
	a) Ignition test		
	A little of the substance is burnt in a nickel spatula.	Burns with a non-luminous flame	Presence of aliphatic compound
	b) Nitration test A little of the substance is heated with 1 ml of conc. nitric acid and 1 ml of conc. sulphuric in a test tube and poured into cold water in a beaker.	No yellow precipitate or solution is obtained	Presence of aliphatic compound
6.	Test for saturation or unsatu	ration	
	a) Bromine-water test A little of the substance is shaken up with 1 ml of water and bromine water is added drop by drop.	No decolourisation takes place readily	Presence of saturated compound
	b)Potassium permanganate test A little of the substance is treated with a dilute solution of potassium permanganate.	No decolourisation takes place readily	Presence of saturated compound
7.	Sodium carbonate test A little of the substance is added to 1 ml of a strong solution of sodium carbonate.	No vigorous effervescence takes place	Absence of acids
8.	Sodium hydroxide test: To a little of the substance about 2 ml of 10% sodium hydroxide solution is added and boiled gently.	On heating ammonia gas is evolved. It gives dense white fumes with a glass rod dipped in conc. hydrochloric acid	May be amides
9.	Soda-Lime test A little of the substance is heated with powdered soda lime and heated strongly.	Ammonia gas is evolved	May be amides
10.	Conc. sulphuric acid test A little of the substance is treated with 2 ml of conc. sulphuric acid and warmed.	No characteristic change	Absence of carbohydrates
11.	Neutral FeCl ₃ test To a little of the substance dissolved in water or alcohol, about 2 ml of neutral ferric chloride is added.	No violet or blue or green colour is obtained	Absence of phenol



	II. Test for functional groups		
1.	Test for acids Ester test A little of the substance is mixed with a few drops of alcohol and 2 drops of conc. sulphuric acid. The mixture is gently warmed and poured into a beaker containing dilute sodium carbonate solution.	No fruity odour is noted	Absence of carboxylic acid
2.	Test for phenols Liebermann's reaction A little of the substance is mixed with a few crystals of sodium nitrate and 3 or 4 drops of conc. sulphuric acid. This is gently warmed and poured into water. To this sodium hydroxide is added and stirred well.	No red solution is obtained	Absence of phenol
3.	Test for carbohydrates Molisch's test To a little of the substance in water a few drops of an alcoholic solution of 1-naphthol are added. To this mixture, conc. sulphuric acid is added along the sides of the test tube without shaking.	No violet ring is obtained	Absence of carbohydrate
4.	Test for Aldehyde and Ketone a) Schiff's reagent test To a little of the substance Schiff's reagent is added and shaken well. b) Legal's test To a little of the substance a few drops of freshly prepared sodium nitroprusside and a few drops of 10% sodium hydroxide is added.	No violet colour is formed No wine red or blue colour is formed	Absence of aromatic aldehyde Absence of ketone



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5.	Test for amides a) Sodium hydroxide test A little of the substance is heated with 5 ml of 10% sodium hydroxide solution till no more ammonia is evolved. It is then cooled and acidified with conc. hydrochloric acid.	No white precipitate is obtained	Presence of an aliphatic amide (urea)
	b) Biuret test A little of the substance is heated in a dry test tube for a few minutes. It is cooled and the residue is dissolved in 2 ml of water. To this 2 drops of dilute copper sulphate solution are added and then 10% sodium hydroxide solution is added dropwise.	Violet colour is obtained	Presence of a diamide like urea
	c) Oxalic acid test To a strong aqueous solution of the substance added oxalic acid solution, shaken well.	White precipitate is obtained	Presence of a diamide like urea
6.	Test for amines Action on nitrous acid A little of the substance is dissolved in about 3 ml of dilute hydrochloric acid. To this a strong solution of sodium nitrate is added drop wise cooling the mixture in ice cold water.	No characteristic change	Absence of aromatic primary amine (aniline)

Report:

 Element present - Presence of nitrogen and absence of special elements like sulphur and other halogens.

2. Aromatic / Aliphatic3. Saturated / Unsaturated- Saturated

4. Functional group present - Diamide like urea

The given organic compound is aliphatic saturated diamide like urea.



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MODEL ANALYSIS-2 Aniline (Amine)

S. No.	Experiment	Observation	Inference	
	I. Preliminary test			
1.	Colour and appearance			
	Colour and appearance	Brown coloured liquid	May be aromatic amines	
	of the substance is noted.	1		
2.	Odour of the substance			
	Odour of the given substance	Aniline like smell	May be aromatic	
	is noted.		amine (aniline)	
			•	
3.	Solubility test			
	Solubility of the given			
	organic substance is tested in			
	the following solvents.			
	T 111 / 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.4.11		
	In dilute hydrochloric acid	Soluble	May be aromatic	
			amine (aniline)	
4.	Preparation of the sodium fu			
			ition tube. To this, a little of	
	the substance is added and the			
	then heated to redness. The red hot end of the tube is plunged in 10 ml of d			
	water in a mortar. The content			
	The filtrate is called sodium fu	sion extract. This is used f	for the following tests.	
) TD + (2 - 14			
	a) Test for nitrogen			
	To about 2 ml of the extract a	Green solution is		
		Offeri Sofution is	Drogonog of nitrogon	
	strong colution of trackly	abtained	Presence of nitrogen	
	strong solution of freshly	obtained	Presence of nitrogen	
	prepared ferrous sulphate is	obtained	Presence of nitrogen	
	prepared ferrous sulphate is added. The solution is boiled,	obtained	Presence of nitrogen	
	prepared ferrous sulphate is added. The solution is boiled, cooled and then dilute	obtained	Presence of nitrogen	
	prepared ferrous sulphate is added. The solution is boiled,	obtained	Presence of nitrogen	
	prepared ferrous sulphate is added. The solution is boiled, cooled and then dilute hydrochloric acid is added.	obtained	Presence of nitrogen	
	prepared ferrous sulphate is added. The solution is boiled, cooled and then dilute hydrochloric acid is added. b) Test for sulphur			
	prepared ferrous sulphate is added. The solution is boiled, cooled and then dilute hydrochloric acid is added. b) Test for sulphur To about 1 ml of the extract	No violet colouration	Presence of nitrogen Absence of sulphur	
	prepared ferrous sulphate is added. The solution is boiled, cooled and then dilute hydrochloric acid is added. b) Test for sulphur To about 1 ml of the extract 1 or 2 drops of freshly			
	prepared ferrous sulphate is added. The solution is boiled, cooled and then dilute hydrochloric acid is added. b) Test for sulphur To about 1 ml of the extract 1 or 2 drops of freshly prepared sodium			
	prepared ferrous sulphate is added. The solution is boiled, cooled and then dilute hydrochloric acid is added. b) Test for sulphur To about 1 ml of the extract 1 or 2 drops of freshly prepared sodium nitroprusside solution is			
	prepared ferrous sulphate is added. The solution is boiled, cooled and then dilute hydrochloric acid is added. b) Test for sulphur To about 1 ml of the extract 1 or 2 drops of freshly prepared sodium nitroprusside solution is added.		_	
	prepared ferrous sulphate is added. The solution is boiled, cooled and then dilute hydrochloric acid is added. b) Test for sulphur To about 1 ml of the extract 1 or 2 drops of freshly prepared sodium nitroprusside solution is added. c) Test for halogens	No violet colouration	Absence of sulphur	
	prepared ferrous sulphate is added. The solution is boiled, cooled and then dilute hydrochloric acid is added. b) Test for sulphur To about 1 ml of the extract 1 or 2 drops of freshly prepared sodium nitroprusside solution is added. c) Test for halogens To about 1 ml of the extract		_	
	prepared ferrous sulphate is added. The solution is boiled, cooled and then dilute hydrochloric acid is added. b) Test for sulphur To about 1 ml of the extract 1 or 2 drops of freshly prepared sodium nitroprusside solution is added. c) Test for halogens To about 1 ml of the extract added 1 or 2 drops of dilute	No violet colouration	Absence of sulphur	
	prepared ferrous sulphate is added. The solution is boiled, cooled and then dilute hydrochloric acid is added. b) Test for sulphur To about 1 ml of the extract 1 or 2 drops of freshly prepared sodium nitroprusside solution is added. c) Test for halogens To about 1 ml of the extract added 1 or 2 drops of dilute nitric acid and 1 or 2 drops of	No violet colouration	Absence of sulphur	
	prepared ferrous sulphate is added. The solution is boiled, cooled and then dilute hydrochloric acid is added. b) Test for sulphur To about 1 ml of the extract 1 or 2 drops of freshly prepared sodium nitroprusside solution is added. c) Test for halogens To about 1 ml of the extract added 1 or 2 drops of dilute	No violet colouration	Absence of sulphur	



5. Test for aliphatic or aromatic character	
a) Ignition test	
A little of the substance Burns with a luminous Presence of	faromatic
is burnt in a nickel spatula. smoky flame compound	
The second secon	
b) Nitration test	
A little of the substance is Yellow solution is Presence of	faromatic
heated with 1 ml of conc. obtained compound	
nitric acid and 1 ml of conc.	
sulphuric in a test tube and	
poured into cold water in a	
beaker.	
6. Test for saturation or unsaturation	
a) Bromine–water test Decolourisation takes Presence of	f saturated
	like amines or
shaken up with 1 ml of water formation of a white phenols	
and bromine water is added precipitate	
drop by drop.	
b)Potassium permanganate Decolourisation takes Presence of	funsaturated
test place readily compound	
	compounds like
treated with a dilute solution phenols or a	
of potassium permanganate.	
7. Sodium carbonate test	
A little of the substance is No vigorous Absence of	acids
added to 1 ml of a strong effervescence takes	
solution of sodium place	
carbonate.	
8. Sodium hydroxide test:	
To a little of the substance No characteristic Absence of	acids,
about 2 ml of 10% sodium change carbohydra	tes and amides
hydroxide solution is added	
and boiled gently.	
9. Soda-Lime test	
A little of the substance is No ammonia gas is Absence of	amides
heated with powdered soda evolved	
lime and heated strongly.	
10. Conc. sulphuric acid test	
	carbohydrates
treated with 2 ml of conc. change	,
sulphuric acid and warmed.	
	f phenol
	•
To a little of the substance green colour is	
To a little of the substance green colour is	
To a little of the substance green colour is dissolved in water or alcohol, obtained	



	II. Test for functional groups		
1.	Test for acids Ester test A little of the substance is mixed with a few drops of alcohol and 2 drops of conc. sulphuric acid. The mixture is gently warmed and poured into a beaker containing dilute sodium carbonate solution.	No fruity odour is noted	Absence of carboxylic acids
2.	Test for phenols Liebermann's reaction A little of the substance is mixed with a few crystals of sodium nitrate and 3 or 4 drops of conc. sulphuric acid. This is gently warmed and poured into water. To this sodium hydroxide is added and stirred well.	No red solution is obtained	Absence of phenol
3.	Test for carbohydrates Molisch's test To a little of the substance in water a few drops of an alcoholic solution of 1-naphthol are added. To this mixture, conc. sulphuric acid is added along the sides of the test tube without shaking.	No violet ring is obtained	Absence of carbohydrate
4.	Test for Aldehyde and Ketone a) Schiff's reagent test To a little of the substance Schiff's reagent is added and shaken well.	No violet colour is formed	Absence of aromatic aldehyde
	b) Legal's test To a little of the substance a few drops of freshly prepared sodium nitroprusside and a few drops of 10% sodium hydroxide is added.	No wine red or blue colour is formed	Absence of ketone



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5.	Test for amides Sodium hydroxide test A little of the substance is heated with 5 ml of 10% sodium hydroxide solution till no more ammonia is evolved. It is then cooled and acidified with conc. hydrochloric acid.	No characteristic change	Absence of amides
6.	Test for amines Action on nitrous acid A little of the substance is dissolved in about 3 ml of dilute hydrochloric acid. To this a strong solution of sodium nitrate is added drop wise cooling the mixture in ice cold water.		Presence of aromatic primary amine (aniline)
	To the clear solution, a solution of 2-naphthol in sodium hydroxide is added.	Scarlet red dye is obtained	Presence of aromatic primary amine (aniline)

Report:

1. Element present - Presence of nitrogen and absence of special elements like

sulphur and other halogens.

2. Aromatic / Aliphatic - Aromatic

3. Saturated / Unsaturated - Saturated

4. Functional group present - Amine

The given organic compound is aromatic saturated amine.



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MODEL ANALYSIS-3

Carbohydrate (Glucose)

S. No.	Experiment	Observation	Inference	
	I. Preliminary test	I		
1.	Colour and appearance			
	Colour and appearance	Colourless solid	May be acids or amides or	
	of the substance is noted.		carbohydrates	
2.	Odour of the substance			
	Odour of the given substance	No characteristic odour	Absence of amine,	
	is noted.		phenols, aldehyde and	
			ketone.	
3.	Solubility test			
	Solubility of the given			
	organic substance is tested in			
	the following solvents.			
	In water	Soluble in the cold	May be carbohydrates	
	III water	condition	or diamide like urea	
			of diamide like drea	
4.	Preparation of the sodium fu			
	1 2		ition tube. To this, a little of	
	the substance is added and the			
	then heated to redness. The red hot end of the tube is plunged in 10 ml of d water in a mortar. The contents are ground well, boiled in a china dish and fi			
	The filtrate is called sodium fu			
	The initiate is called socium to	Sion extract. This is used i	of the following tests.	
	a) Test for nitrogen			
	To about 2 ml of the extract a	No blue or green	Absence of nitrogen	
	strong solution of freshly	precipitate or solution		
	prepared ferrous sulphate is	is obtained		
	added. The solution is boiled,			
	cooled and then dilute			
	hydrochloric acid is added.			
	b) Test for sulphur			
	To about 1 ml of the extract	No violet colouration	Absence of sulphur	
	1 or 2 drops of freshly			
	prepared sodium			
	nitroprusside solution is added.			
	c) Test for halogens			
	To about 1 ml of the extract	No precipitate	Absence of halogens	
	added 1 or 2 drops of dilute	140 precipitate	7 toschee of halogens	
	nitric acid and 1 or 2 drops of			
	silver nitrate solution is			
	added.			
	2 			



5.	Test for aliphatic or aromatic	c character	
	a) Ignition test		
	A little of the substance	Burns with a non-	Presence of aliphatic
	is burnt in a nickel spatula.	luminous flame	compound
			r · · ·
	b) Nitration test		
	A little of the substance is	No yellow precipitate	Presence of aliphatic
	heated with 1 ml of conc.	or solution is obtained	compound
	nitric acid and 1 ml of conc.		
	sulphuric in a test tube and		
	poured into cold water in a		
	beaker.		
6.	Test for saturation or unsatu	ration	
	a) Bromine-water test		
	A little of the substance is	No decolourisation	Presence of saturated
	shaken up with 1 ml of water	takes place readily	compound
	and bromine water is added		1
	drop by drop.		
	b)Potassium permanganate		
	test	No decolourisation	Presence of saturated
	A little of the substance is	takes place readily	compound
	treated with a dilute solution	7	
	of potassium permanganate.		
7.	Sodium carbonate test		
, .	A little of the substance is	No vigorous	Absence of acids
	added to 1 ml of a strong	effervescence takes	
	solution of sodium	place	
	carbonate.	T	
8.	Sodium hydroxide test:		
	To a little of the substance	Solution turns yellow	May be carbohydrates
	about 2 ml of 10% sodium	or brown on boiling	
	hydroxide solution is added		
	and boiled gently.		
9.	Soda-Lime test		
	A little of the substance is	No ammonia gas is	Absence of amides
	heated with powdered soda	evolved	
	lime and heated strongly.		
10.	Conc. sulphuric acid test		
	A little of the substance is	The substance chars	May be carbohydrates
	treated with 2 ml of conc.	with smell of burnt	
	sulphuric acid and warmed.	sugar	
11.	Neutral FeCl ₃ test		
11.	To a little of the substance	No violet or blue or	Absence of phenol
11.	To a little of the substance dissolved in water or alcohol,	green colour is	Absence of phenol
11.	To a little of the substance		Absence of phenol



	II. Test for functional groups		
1.	Test for acids Ester test A little of the substance is mixed with a few drops of alcohol and 2 drops of conc. sulphuric acid. The mixture is gently warmed and poured into a beaker containing dilute sodium carbonate solution.	No fruity odour is noted	Absence of carboxylic acids
2.	Test for phenols Liebermann's reaction A little of the substance is mixed with a few crystals of sodium nitrate and 3 or 4 drops of conc. sulphuric acid. This is gently warmed and poured into water. To this sodium hydroxide is added and stirred well. Test for carbohydrates	No red solution is obtained	Absence of phenol
J.	a) Molisch's test To a little of the substance in water a few drops of an alcoholic solution of 1-naphthol are added. To this mixture, conc. sulphuric acid is added along the sides of the test tube without shaking.	Violet ring is obtained at the junction of the two layers and this spreads slowly	Presence of carbohydrate
	b) Tollen's reagent test To a little of the substance add about 2 ml of Tollen's reagent. This is shaken well and heated in a boiling water bath. c) Fehling's test	Black precipitate or bright silver mirror is formed	Presence of carbohydrate
	1 ml of Fehling solution (A) is mixed with 1 ml of Fehling solution (B). The mixture is added to a little of the substance dissolved in water, shaken well and heated in a boiling water bath.	Red precipitate is obtained	Presence of reducing sugars



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4.	Test for Aldehyde and		
٦.	Ketone		
	a) Schiff's reagent test		
	To a little of the substance	No violet colour is	Absence of aromatic
	Schiff's reagent is added and	formed	aldehyde
	shaken well.	Torried	aidenyde
	b) Legal's test		
	To a little of the substance a	No wine red or blue	Absence of ketone
	few drops of freshly prepared	colour is formed	
	sodium nitroprusside and a		
	few drops of 10% sodium		
	hydroxide is added.		
5.	Test for amides		
	Sodium hydroxide test		
	A little of the substance is	No characteristic	Absence of amides
	heated with 5 ml of 10%	change	
	sodium hydroxide solution		
	till no more ammonia is		
	evolved. It is then cooled and		
	acidified with conc.		
	hydrochloric acid.		
	77		
6.	Test for amines		
	Action on nitrous acid		
	A little of the substance is	No shama atamiatia	Absence of aromatic
	dissolved in about 3 ml of	No characteristic	
	dilute hydrochloric acid. To this a strong solution of	change	primary amine (aniline)
	this a strong solution of sodium nitrate is added drop		
	wise cooling the mixture in		
	ice cold water.		
1	100 0014 114001.		

Report:

1. Element present - Absence of special elements like nitrogen, sulphur and other halogens.

2. Aromatic / Aliphatic - Aliphatic

3. Saturated / Unsaturated - Saturated

4. Functional group present - Carbohydrate

The given organic compound is aliphatic saturated carbohydrate.



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MODEL ANALYSIS-4

Benzoic acid (Monocarboxylic acid)

S. No.	Experiment	Observation	Inference
	I. Preliminary test	I	
1.	Colour and appearance Colour and appearance of the substance is noted.	Colourless solid	May be acids or amides or carbohydrates
2.	Odour of the substance Odour of the given substance is noted.	No characteristic odour	Absence of amine, phenols, aldehyde and ketone.
3.	Solubility test Solubility of the given organic substance is tested in the following solvents.		
	In water	Soluble in the hot condition	May be aromatic acids or amides
4.	A piece of dry sodium futhe substance is added and the then heated to redness. The rewater in a mortar. The content The filtrate is called sodium futher than the substance is added and the then heated to redness. The rewater in a mortar. The content the filtrate is called sodium futher than the substance of the	tal is fused well in an igni- te tube is heated gently un ed hot end of the tube is p ts are ground well, boiled	olunged in 10 ml of distilled in a china dish and filtered.
	a) Test for nitrogen To about 2 ml of the extract a strong solution of freshly prepared ferrous sulphate is added. The solution is boiled, cooled and then dilute hydrochloric acid is added.	No blue or green precipitate or solution is obtained	Absence of nitrogen
	b) Test for sulphur To about 1 ml of the extract 1 or 2 drops of freshly prepared sodium nitroprusside solution is added.	No violet colouration	Absence of sulphur
	c) Test for halogens To about 1 ml of the extract added 1 or 2 drops of dilute nitric acid and 1 or 2 drops of silver nitrate solution is added.	No precipitate	Absence of halogens



5.	Test for aliphatic or aromatic character				
	a) Ignition test				
	A little of the substance is burnt in a nickel spatula.	Burns with a luminous smoky flame	Presence of aromatic compound		
	b) Nitration test				
	A little of the substance is heated with 1 ml of conc. nitric acid and 1 ml of conc. sulphuric in a test tube and poured into cold water in a beaker.	Yellow solution is obtained	Presence of aromatic compound		
6.	Test for saturation or unsatu	ration			
	a) Bromine-water test A little of the substance is shaken up with 1 ml of water and bromine water is added drop by drop.	No decolourisation takes place readily	Presence of saturated compound		
	b)Potassium permanganate test A little of the substance is treated with a dilute solution of potassium permanganate.	No decolourisation takes place readily	Presence of saturated compound		
7.	A little of the substance is added to 1 ml of a strong solution of sodium carbonate.	Vigorous effervescence takes place evolving carbon dioxide gas	Presence of acids		
8.	Sodium hydroxide test: To a little of the substance about 2 ml of 10% sodium hydroxide solution is added and boiled gently.	Dissolves readily in the cold condition and the substance is regenerated on adding dilute hydrochloric acid	Presence of acids		
9.	Soda-Lime test				
	A little of the substance is heated with powdered soda lime and heated strongly.	No ammonia gas is evolved	Absence of amides		
10.	A little of the substance is treated with 2 ml of conc. sulphuric acid and warmed.	No characteristic change	Absence of carbohydrates		



11.	Neutral FeCl ₃ test		
	To a little of the substance	No violet or blue or	Absence of phenol
	dissolved in water or alcohol,	green colour is	1
	about 2 ml of neutral ferric	obtained	
	chloride is added.		
	II. Test for functional groups	<u> </u>	
1.	Test for acids		
	a) Ester test		
	A little of the substance is	A pleasant fruity odour	Presence of carboxylic
	mixed with a few drops of	is noted	acid
	alcohol and 2 drops of		
	conc. sulphuric acid. The		·
	mixture is gently warmed		
	and poured into a beaker		
	containing dilute sodium		
	carbonate solution.		
	b) Phenolphthalein test	D' 1 1 1'	D 0 1 1:
	To about 2 ml of sodium	Pink colour disappears	Presence of carboxylic
	hydroxide solution, 1 drop of		acid
	dilute phenolphthalein		
	indicator is added pink		
	colour appears. To this, the substance dissolved in water		
	or alcohol is added drop by		
	drop in excess.		*
	c) Fluorescein test		
	A small amount of the	No intense greenish	Presence of
	substance is mixed with few	yellow fluorescence is	monocarboxylic acid
	drops of resorcinol in a dry	produced	3
	test tube. 3 drops of conc.		
	sulphuric acid is added.		
	Shake well, boil gently and		
	then pour into 100 ml of cold		
	water taken in a beaker. Stir		
	well and then sodium		
	hydroxide solution is added		
	in drops.		
2.	Test for phenols		
	Liebermann's reaction	NI 1 1	A1
	A little of the substance is	No red solution is	Absence of phenol
	mixed with a few crystals of	obtained	
	sodium nitrate and 3 or 4		
	drops of conc. sulphuric acid. This is gently warmed		
	and poured into water. To		
	this sodium hydroxide is		
	added and stirred well.		
	added and stiffed Well.		



3.	Test for carbohydrates		
	Molisch's test		
	To a little of the substance in	No violet ring is	Absence of carbohydrate
	water a few drops of an	obtained	
	alcoholic solution of		
	1-naphthol are added. To this		
	mixture, conc. sulphuric acid		
	is added along the sides of		
	the test tube without shaking.		
4.	Test for Aldehyde and		
	Ketone		
	a) Schiff's reagent test	No violet colourie	A la doma a a fi amamati a
	To a little of the substance	No violet colour is formed	Absence of aromatic aldehyde
	Schiff's reagent is added and shaken well.	IOIIIICU	aidenyde
	SHAKOH WOH.		
	b) Legal's test		
	To a little of the substance a	No wine red or blue	
	few drops of freshly prepared	colour is formed	Absence of ketone
	sodium nitroprusside and a		
	few drops of 10% sodium		
	hydroxide is added.		
5.	Test for amides		
	Sodium hydroxide test		
	A little of the substance is	No characteristic	Absence of amides
	heated with 5 ml of 10%	change	
	sodium hydroxide solution till no more ammonia is		
	till no more ammonia is evolved. It is then cooled and		
	acidified with conc.		
	hydrochloric acid.		
6.	Test for amines		
	Action on nitrous acid		
	A little of the substance is	No characteristic	Absence of aromatic
	dissolved in about 3 ml of	change	primary amine (aniline)
	dilute hydrochloric acid. To		
	this a strong solution of		
	sodium nitrate is added drop		
	wise cooling the mixture in		
	ice cold water.		



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Report:

1. Element present - Absence of special elements like nitrogen, sulphur and other

halogens.

2. Aromatic / Aliphatic3. Saturated / Unsaturated- Saturated

4. Functional group present - Monocarboxylic acid

The given organic compound is aromatic saturated monocarboxylic acid.

