CHAPTER 4

RESULTS AND OBSERVATIONS

1. Physical Characteristics of the Anthocyanin Pigment

The ethanolic extract obtained from fresh red rose petals was examined for its physical characteristics**.**

Property	Observation
Colour	Wine red
State	Liquid
Appearance	Clear
Odour	Characteristic rose smell

Result: The extracted rose-petal pigment was observed as a wine-red coloured liquid with clear appearance and an alcoholic odour.

2. Solubility Test

1mL of pigment extract + 2mL of solvent was used for the solubility test.

S.No	Solvent	Observed Solubility	Observed Colour
1.	Distilled water	Highly soluble	Reddish-pink
2.	Ethanol	Soluble	Brownish
3.	Acetone	Partially soluble	Light brownish

Result: The pigment extract showed high solubility in distilled water and good solubility in 95% ethanol, while comparatively lower solubility was observed in acetone. This indicates that the extracted pigment has a predominantly polar nature.

3. pH Stability

The pH of the extract was measured at different pH conditions (acidic, neutral and alkaline).

pH	Initial colour	Colour after 1hr
2.24 (acidic)	wine red	Deep red
7.06 (neutral)	wine red	Purple
9.13 (alkaline)	wine red	Bluish - purple

Result: The colour of the pigment extract varied with pH, showing deep red under acidic conditions and changing towards purple/bluish shades at higher pH. This confirms that the pigment is sensitive to changes in pH.

4. Thermal Stability

Tested the control, 40°C, 60°C and 80°C and observed the colour after approximately 30 minutes.

Temperature	Initial colour	Colour after 30 mins	Interpretation
Control	Wine red	Wine red	Stable
40°	Wine red	Wine red	Stable
60°	Wine red	Brownish	Some degradation
80°	Wine red	More brownish	More degradation

Result: The pigment showed comparatively better colour stability at lower temperatures, while greater colour change was observed at higher temperatures. This indicates that prolonged exposure to heat can affect the stability of the pigment

5. Water Resistance Test

Sample	Treatment	Observation	Result
Cotton cloth dyed with rose petal pigment	Before washing	Cloth showed a purple colour due to absorbed pigment	-
Same cotton cloth	Washed with distilled water	Colour was retained with little fading	Good water resistance

Result: The cotton cloth treated with the rose-petal pigment retained its colour after washing with distilled water, with little visible loss of pigment. This indicates that the extracted pigment showed good water resistance on cotton fabric.

6. Overall results of Characterization

S.No	Characterization tests	Major results
1.	Physical characteristics	Wine-red, liquid pigment extract
2.	Solubility	Highly soluble in distilled water; soluble in 95% ethanol
3.	pH stability	Colour changed from red under acidic conditions to purple/bluish shades at higher pH
4.	Thermal stability	Relatively stable at lower temperature; colour changed more at higher temperature
5.	Water resistance	Cotton cloth retained the pigment colour after

		washing with distilled water

1.Physical characteristics of Curcumin Containing Extract

The ethanolic extract obtained from turmeric powder was examined for its physical characteristics.

Property	Observation
Colour	Yellow- Orange
State	Liquid
Appearance	Clear to slightly turbid
Odour	Characteristic odour of turmeric

Result: The extracted curcumin-containing pigment was observed as a yellow-orange coloured liquid with a clear to slightly turbid appearance and a characteristic odour of turmeric.

2. Solubility test

For the solubility test, 2ml of pigment extract was mixed with 4ml of each solvent.

S.No.	Solvent	Observed Solubility	Observed Colour
1.	Distilled water	Very slightly soluble	Pale yellow - Yellow
2.	Ethanol	Soluble	Yellow- Orange
3.	Acetone	Soluble	Yellow

Result: The curcumin-containing extract showed very low solubility in distilled water, whereas it dissolved readily in ethanol and acetone. This indicates that the extracted pigment has greater solubility in organic solvents than in water.

3. pH stability

The pH of the extract was measured at different pH conditions

pH	Initial colour	Colour observation
2.74 (acidic)	Yellow- Orange	Yellow- Orange

7.63(nearly neutral)	Yellow- Orange	Orange - Reddish
9.17(alkaline)	Yellow - Orange	Dark reddish brown

Result: The curcumin-containing pigment showed a noticeable colour change under alkaline conditions. The yellow-orange colour was retained under acidic and nearly neutral conditions, whereas a darker orange to reddish-brown shade was observed at higher pH. This indicates that the pigment is sensitive to changes in pH.

4.Thermal stability

The thermal stability of the extracted pigment was studied using a control and samples exposed to 40°C, 60°C, and 80°C. The colour of the pigment was observed after approximately 30 minutes.

Temperature	**Initial colour**	**Colour after 30 mins**	**Interpretation**
Control	Yellow- Orange	Yellow-Orange	Stable
40°C	Yellow-Orange	Yellow-Orange	Stable
60°C	Yellow-Orange	Yellow-Orange	Stable
80°C	Yellow-Orange	Yellow-Orange	Stable

Result: No visible change in the colour or appearance under the conditions tested, the extracted pigment showed good thermal stability.

5.Water resistance test

The water resistance of the extracted pigment was studied by applying the pigment to cotton cloth and washing it with distilled water.

Sample	**Treatment**	**Observation**	**Result**
Cotton cloth dyed with curcumin pigment	Before washing	Bright yellow colour was visible on the cotton cloth	-
Same cotton cloth	Washed with	No noticeable fading	Good water

	distilled water	of the pigment was observed	resistance

Result: The cotton cloth treated with the curcumin-containing pigment retained its colour after washing with distilled water. No noticeable fading or removal of the pigment was observed. This indicates good water resistance on cotton fabric under the tested conditions.

6.Overall result of Characterization

S.No.	Characterization tests	Major results
1.	Physical characteristics	Yellow-Orange, liquid pigment extract
2.	Solubility	Very slightly soluble in distilled water; soluble in ethanol and acetone
3.	pH stability	Yellow- Orange colour retained under acidic and nearly neutral conditions; dark reddish brown shade observed under alkaline conditions
4.	Thermal stability	No visible colour change observed at different temperature conditions; stable
5.	Water resistance	Cotton cloth retained the pigment colour after washing with distilled water,with no noticeable fading.