DISCUSSION

5.1.Anthocyanin Pigment from Red Rose Petals

The ethanolic extraction of red rose petals produced a distinct coloured extract, confirming the presence of anthocyanin pigments. The pH test showed noticeable colour variation with changes in pH. This behaviour is characteristic of anthocyanins, whose chemical structure and colour are strongly influenced by the acidity of the medium. The pigment generally shows better stability in acidic conditions, whereas changes towards neutral or alkaline conditions can result in colour changes and reduced stability.

The thermal-stability observations further indicated that temperature influences the stability of the extracted pigment. The colour-retention observed on cotton cloth after washing with distilled water suggests that the extracted pigment showed some degree of attachment and colour retention on the fabric. However, this was a preliminary observation and not a standardized colour-fastness test. The findings are consistent with earlier studies reporting red rose petals as a natural source of anthocyanins and demonstrating their characteristic sensitivity to pH and temperature. Overall, the results indicate that red rose petals have potential as a natural source of anthocyanin pigment.

5.2 Curcumin Pigment

The present study successfully extracted a yellow-orange coloured pigment from turmeric using ethanol, indicating the presence of curcuminoid compounds. The observed solubility behaviour was consistent with the known properties of curcumin, which has limited solubility in water but is more readily extracted in organic solvents such as ethanol. The pH test showed changes in pigment behaviour with variation in pH, indicating that curcumin is sensitive to the surrounding medium. The thermal-stability test showed that the pigment retained its colour to some extent on heating, although prolonged exposure to higher temperatures may cause degradation.

These findings are in agreement with earlier studies which have reported ethanol as an effective solvent for the extraction of curcuminoids from turmeric. Previous research has also demonstrated that curcumin is affected by pH and temperature, particularly under alkaline and prolonged heating conditions. The results of the present study therefore support the use of turmeric as a natural source of curcumin pigment and demonstrate its characteristic stability and colour properties under simple laboratory conditions.

5.3 Comparative Discussion of the Two Pigments

Both curcumin and anthocyanin extracts demonstrated the potential of plant materials as sources of natural pigments, but they showed different characteristic properties. The curcumin extract produced a yellow-orange colour, whereas the red rose extract produced a red-coloured pigment. The most noticeable difference was their response to pH. Curcumin showed changes in pigment behaviour with pH, while anthocyanins exhibited more pronounced colour changes because of their strong pH-dependent structural transformations.

The two pigments also differ in their stability and chemical nature. Curcumin is a curcuminoid pigment, while anthocyanins belong to the flavonoid group. Both pigments can be affected by temperature, but anthocyanins are generally considered more sensitive to environmental conditions such as pH and heat. In terms of solubility, curcumin has poor water solubility, whereas anthocyanins are generally more compatible with aqueous systems, particularly under acidic conditions.

Thus, the present comparison demonstrates that although both pigments can be obtained from natural plant sources, their properties and potential applications differ. Curcumin may be useful where a yellow-orange natural colour is required, while anthocyanins offer a wider range of pH-dependent colours and may be useful as natural colourants and pH-sensitive indicators. The findings of the present study are broadly consistent with earlier research on the extraction and stability characteristics of both pigment groups.