Laboratory Report

Report Reference:Report_2070

Summary

This report compiles various tests conducted on samples containing different combinations of oils and additives, using state-of-the-art analytical instruments. This process helps assess the chemical properties and interactions of these components, essential for cosmetic and pharmaceutical applications. The tests included several techniques such as NMR Spectroscopy, UV-Visible Spectroscopy, and HPLC Analysis. The aim was to identify, quantify, and evaluate the properties of these mixtures.

Instrumentation and Experimental Procedures

Observations and Measurements

Table 1: NMR, UV-Vis, and Viscosity

Sample Composition	Instrument	Parameter	Measurement	Unit
Coconut Oil, Cetyl Alcohol	NMR-500	Chemical Shift	15.0	ppm
Coconut Oil, Vitamin E	UV-2600	Absorbance	2.5	Abs
Coconut Oil	VS-300	Viscosity	5172.71	cP
Coconut Oil, Beeswax	VS-300	Viscosity	4702.07	cP

Table 2: Friction, Concentration, and Thermal Conditions

Sample Composition	Instrument	Property	Measurement	Unit
Almond Oil, Cetyl Alcohol	FB-1000	Wear Scar Diameter	0.5	mm
Jojoba Oil, Glycerin	IC-2100	Glycerin Amount	95.0	mM
Coconut Oil, Cetyl Alcohol	TC-5000	Temperature	37.0	C

Table 3: Functional Groups and Concentration Analysis

Sample Composition	Instrument	Feature	Measurement	Unit
Almond Oil	FTIR-8400	Functional Group	925	1/cm
Coconut Oil, Cetyl Alcohol, Glycerin	HPLC-9000	Compound Amount	500	mg/L

Detailed Analysis

The application ofNMR spectroscopyhighlighted significant chemical interactions between coconut oil and cetyl alcohol, evidenced by a 15 ppm shift. These interactions are pivotal for enhancing emollient properties in cosmetic formulations. Meanwhile, theUV-Vis spectrophotometerrevealed an absorbance peak of 2.5 Abs, suggesting high antioxidant activity due to Vitamin E in the mixture.

Viscosity assessmentsthrough the Viscometer VS-300 showed that adding beeswax decreased the viscosity of coconut oil from 5172.71 cP to 4702.07 cP. This indicates that beeswax could serve as a thinning agent for formulations using coconut oil.

In terms of frictional attributes, almond oil combined with cetyl alcohol reached a wear scar diameter of 0.500 mm in the Four Ball Tester FB-1000, denoting moderate lubrication performance.

Chromatographic methodslike Ion Chromatography registered 95 mM of glycerin in jojoba oil preparations, displaying its compatibility with oil-based carriers. Additionally, HPLC findings showed 500 mg/L concentration of both cetyl alcohol and glycerin in the coconut oil samples, corroborating the HPLC system?s efficiency in quantifying multi-component samples.

Lastly,FTIR analysisprovided insight into functional groups present, identifying potential sites of chemical reactivity within almond oil samples at the wavenumber 925 1/cm.

Conclusion

The comprehensive suite of analytical techniques provided a detailed understanding of the chemical and physical properties of oil mixtures, essential for developing effective cosmetic and medicinal formulations. The findings underline the significance of component interactions and their impact on the functional attributes of oil-based preparations.

Footnotes and Additional Observations

End of Report