

Introduction

This report provides an in-depth analysis of various oil-based mixtures using advanced analytical techniques. Each mixture was tested using a specific instrument to assess different properties such as spectral characteristics, thermal stability, rheological behavior, gas composition, and more. The study aims to better understand the behavior of complex formulations like those seen in food, cosmetic, and pharmaceutical industries.

Experimental Setup and Methods

Different instruments were employed to measure specific attributes of each sample:

Results and Discussion

The analyses provided unique insights into the properties of the tested mixtures, detailed in Tables 1, 2, and 3. Below is a comprehensive description of each test and its results:

Spectrometry Analysis:

The spectral analysis of mixtures was conducted using theSpectrometer Alpha-300. Mixtures like "Coconut Oil, Gum," were examined at wavelengths reaching 550 nm, while "Jojoba Oil, Gum," extended this to 600 nm. These wavelengths indicate different absorptive properties relevant to compositional variations.

Test ID	Instrument	Mixture	Wavelength (nm)
1	Alpha-300	Coconut Oil, Gum	550
2	Alpha-300	Jojoba Oil, Gum	600

Thermal Analysis:

Using theX-Ray Diffractometer XRD-6000, thermal stability was tested. "Almond Oil, Gum" showed resilience at 85°C, contrasting with the "Almond Oil, Cetyl Alcohol, Glycerin" mixture, which maintained stability at a lower temperature of 70°C. This suggests differential structural integrity influenced by additional functional groups.

Test ID	Mixture	Temperature (°C)
3	Almond Oil, Gum	85
4	Almond Oil, Cetyl Alcohol, Glycerin	70

Rheological Analysis:

The Rheometer R-4500 provided viscosity and flow characteristics as follows:

These readings suggest that the presence of beeswax reduces viscosity, enhancing flow.

Gas Chromatography and Ionic Analysis:

Using Gas Chromatograph GC-2010, volatile components were identified, with the composition "Almond Oil, Beeswax, Glycerin" reaching concentrations of 350 ppm. Additionally, Ion Chromatograph IC-2100 revealed ionic species like those in "Almond Oil, Gum, Vitamin E" with a concentration of 0.75 mM.

Test ID	Instrument	Mixture	Concentration (ppm/mM)
5	GC-2010	Almond Oil, Beeswax, Glycerin	350 ppm
6	IC-2100	Almond Oil, Gum, Vitamin E	0.75 mM

Optical Properties:

The UV-Vis Spectrophotometer UV-2600 measurements for "Coconut Oil, Cetyl Alcohol" indicated an absorbance of 1.8 Abs. This suggests a potential for significant light absorption, valuable for formulation of sunscreens or similar applications.

Viscosity Measurements:

Finally, viscosity as per the Viscometer VS-300 recorded the following:

These discrepancies highlight the impact of additional ingredients in altering fluid dynamics.

Test ID	Mixture	Viscosity (cP)
7	Jobba Oil, Gum, Vitamin E	2098.88

8	Almond Oil	7437.92
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Concluding Remarks

This lab report underscores the intricate details and characteristics of various oil-based mixtures, enriched with diverse additives. Utilizing spectroscopic, rheological, and chromatographic techniques, the findings provide a foundational understanding for future formulation optimizations.

Further research is recommended to explore long-term stability and interactive effects under different environmental conditions.