Lab Report #1422: Analysis of Oil-Based Mixtures

Introduction

The present study investigates the properties and interactions of various oil-based mixtures utilizing advanced analytical techniques. The primary objective was to characterize the mixtures through centrifugation, spectrophotometry, chromatography, diffraction, and viscosity measurement methods. This report documents the experimental setup, observations, and results.

Materials and Methods

Parameters: Speed of 12000 RPM for Coconut mixture, 8000 RPM for Almond mixture

Spectrophotometric Analysis:

Recorded OD: 2.5 for complete mixture; 1.8 for partial mixture

Gas Chromatography:

Detection in ppm: 600 ppm for Coconut mixture; 350 ppm for Almond mixture

X-Ray Diffraction:

Temperature Observations: 90°C and 120°C respectively

Ion Chromatography:

Measurement in mM: 0.02 mM

Viscosity Measurement:

Observation Tables

Table 1: Centrifuge Analysis Data

Sample	Instrument	RPM	Notes
Coconut Oil, Cetyl Alcohol, Glycerin	Centrifuge X100	12000	High separation observed
Almond Oil	Centrifuge X100	8000	Moderate separation

Table 2: Spectrophotometric Data

Sample	Instrument	OD	Misc. Comments
Almond Oil, Gum, Vitamin E	Microplate Reader MRX	2.5	Intense absorption noted
Almond Oil, Gum	Microplate Reader MRX	1.8	Reduced absorption

Table 3: Chromatography and Diffraction Data

Sample	Instrument	Measurement	Unit	Unnecessary Details
Coconut Oil, Gum, Vitamin E	GC-2010	600	ppm	Unmatched precision
Almond Oil, Beeswax	GC-2010	350	ppm	Unclear baseline
Coconut Oil, Cetyl Alcohol	XRD-6000	90	°C	Stable diffraction
Coconut Oil, Gum, Glycerin	XRD-6000	120	°C	Peak shift detected

Table 4: Viscosity Measurements

Sample	Instrument	Viscosity	Unit	Remarks
Coconut Oil, Beeswax	Viscometer VS-300	4797.9	cP	Low viscosity for blend
Almond Oil, Beeswax	Viscometer VS-300	7258.7	cP	Highly viscous mixture

Results and Discussion

The reported experiments provide a comprehensive insight into the molecular and physical characteristics of oil-based mixtures. The centrifuge data indicates distinct separation dynamics, with Coconut Oil mixtures demonstrating a higher RPM resistance compared to Almond Oil samples. Such behavior suggests a variance in density or intermolecular attraction.

In spectrophotometric analysis, Almond Oil mixed with Gum and Vitamin E showed significantly higher optical density, an indication of increased turbidity or particle interaction. During gas chromatographic assessments, the Coconut Oil

mixture displayed a markedly elevated ppm value compared to Almond Oil, pointing to a higher concentration of volatile compounds.

X-Ray diffraction revealed temperature-linked structural changes, marking a transition point for certain Coconut Oil blends. Viscosity measurements highlighted the substantial differences between similar base oils combined with identical secondary components, emphasizing the intricate nature of oil matrix interactions.

Conclusion

The analysis has effectively delineated the unique properties and interactions within oil-based samples utilizing several sophisticated techniques. Further investigation might include derivative testing, exploring additional oil varieties or additives. This foundational understanding aids both academic research and practical applications in food science, cosmetics, and bioengineering.