Lab Report #1369

Abstract

This report details the analysis of various oil-based mixtures using different laboratory instruments. The investigation focused on sample properties such as concentration, composition, and molecular structure. Each sample was prepared by combining specified ingredients and tested with distinct methods tailored to their physical and chemical characteristics.

Introduction

Natural oils, used in numerous cosmetic and food applications, often require precise analysis to ensure their efficacy and safety. This study examines three types of oils (Almond, Jojoba, and Coconut) each combined with other ingredients (such as Gum, Vitamin E, Cetyl Alcohol, Beeswax, and Glycerin) to investigate their specific properties. Advanced instrumentation techniques were employed across a broad spectrum of tests, including spectrometry, chromatography, and rheological analysis.

Methods and Instruments

Spectrometric Analysis

The Spectrometer Alpha-300 was used to determine the absorption properties of Almond Oil mixtures. The specific wavelength of investigation was 650 nm, chosen for its relevance to the oil's molecular structure.

Chromatographic Techniques

Liquid Chromatograph LC-400 facilitated the separation and quantification of compounds in Jojoba Oil blends, targeting Vitamin E with a concentration of 250 µg/mL. Furthermore, the Gas Chromatograph GC-2010 analyzed Almond Oil amalgams for Glycerin content, registering 150 ppm.

Molecular Detection

The PCR Machine PCR-96 detected Vitamin E presence in Coconut Oil blends through a cycle threshold (Ct) count of 18. High pressure in the HPLC System HPLC-9000 revealed concentrations of 500 mg/L for Almond Oil and Gum mixtures.

Additional Testing Procedures

Results

Sample ID	Instrument	Mixture Components	Target Compound	Measured Value	Units
1369-1	Spectrometer Alpha-300	Almond Oil, Gum	nan	650.0	nm
1369-2	Liquid Chromatograph LC-400	Jojoba Oil, Vitamin E	Vitamin E	250.0	µg/mL
1369-3	PCR Machine PCR-96	Coconut Oil, Cetyl Alcohol, Vitamin E	Vitamin E	18.0	Ct
1369-4	Gas Chromatograph GC-2010	Almond Oil, Beeswax, Glycerin	Glycerin	150.0	ppm
1369-5	Centrifuge X1000	Jojoba Oil, Cetyl Alcohol, Glycerin	nan	12000.0	RPM
1369-6	HPLC System HPLC-9000	Almond Oil, Gum	Gum	500.0	mg/L
1369-7	UV-Vis Spectrophotometer UV-2600	Coconut Oil, Cetyl Alcohol, Vitamin E	nan	2.8	Abs
1369-8	Titrator T-905	Jojoba Oil, Vitamin E	Vitamin E	0.004	M
1369-9	Viscometer VS-300	Coconut Oil, Glycerin	nan	5086.21	cP
1369-10	Viscometer VS-300	Coconut Oil	nan	4959.67	cP
1369-11	Viscometer VS-300	Coconut Oil, Cetyl Alcohol	nan	5142.35	cP

Observations

The heterogeneity in sample composition led to varied responses across different techniques. Some impurities possibly affected the spectrometric readings, providing a broad spectrum of absorption results rarely seen in other studies. Unexpected viscosity ranges in Coconut Oil highlight further potential for analysis in rheological behavior adjustments.

Miscellaneous Notes

Notably, unrelated to the current study but worth mentioning is the keen interest in ambient lab conditions affecting instrument calibration. The surround sound in the lab at one point hindered concentration, alongside the tantalizing

aroma of roasted almond oil samples which was quite delightful.

Discussion

The results illustrate differences in active compound presence across oil mixtures and highlight the instruments' effectiveness in discerning these variations. For instance, cetyl alcohol exhibited consistent readings in multiple tests, confirming its homogeneity within mixtures. Anomalies in the PCR results suggest more nuanced methodologies may be needed for future Vitamin E analyses.

Conclusion

Comprehensive testing of oil-based mixtures underscores the complex interactions within formulations pivotal to both scientific and industrial applications. Further research focusing on environmental and biological impact is advisable, complementing the data herein presented.

Supplementary Information

Present data, though partly immersed in unordered observations and non-core content, provides foundational knowledge that could push forward research in oil constituent analysis, emphasizing real-world applicability in product development and quality control.