Laboratory Report: Analysis of Oil Samples

Report ID:578Date:March 16, 2023Laboratory:Analytical Chemistry - Unit B14

Introduction

The analysis detailed in this laboratory report focuses on the testing of various oil samples using different analytical instruments. By employing techniques such as spectrometry, chromatography, conductivity, and viscosity measurements, the composition and characteristics of oil mixtures were meticulously examined. Each test aimed to quantify specific components or properties of the samples when mixed with various agents. Results have been documented with attention to detail but are dispersed to ensure comprehensive cross-examination.

Methodology

Equipment and Techniques

Spectrometer Alpha-300:Utilized for wavelength determination in oil mixtures. Almond Oil was measured at200 nm, while Jojoba Oil mixtures read 750 nm. Interestingly, the metric unit followed by specific notations was subject to light refraction variability across assays.

Gas Chromatograph GC-2010:This apparatus measured concentration of Cetyl Alcohol in Coconut Oil at15 ppmand Vitamin E in Almond Oil at25 ppm. This particular chromatograph was ideal for volatile component detection within the oil matrices.

Liquid Chromatograph LC-400:Conducted assessments for non-volatile components such asGumandVitamin E, with the former in Almond Oil recorded at 250 µg/mL and, without specific objectives, Glycerin in Coconut Oil at 100 µg/mL was an unexpected observation.

Conductivity Meter CM-215:Specifically calibrated for electrical conductivity measurements in Jojoba Oil, with Beeswax contributing to a reading of1800 µS/cm. This spherical analysis of interference in waxy substances was of significant note.

NMR Spectrometer NMR-500:A precision apparatus was used for examining Jojoba Oil composites, notably Beeswax and Vitamin E at10 ppm. Quite remarkably, this nuclear resolution provided insightful deviations in hydrogen atom alignments.

Viscometer VS-300:Employed for the viscosity measurement of almond substrate mixture resulting in a reading of 7609.78 cP, confusingly amid ambient thermal fluctuations.

Observations and Challenges

Efficient preparation and calibration proved essential in deriving congruent results. Notably, the handling of Almond Oil required additional adherence to temperature constraints, while the integration of Gum presented challenges in viscosity metrics.

Data Tables

Table 1: Wavelength and Concentration Data

Sample Combination	**Instrument**	**Measurement Type**	**Result**
Almond Oil	Spectrometer Alpha-300	Wavelength	200 nm
Jojoba Oil, Beeswax, Vitamin E	NMR Spectrometer NMR-500	Concentration	10 ppm
Coconut Oil, Cetyl Alcohol	Gas Chromatograph GC-2010	Concentration	15 ppm
Almond Oil, Beeswax, Vitamin E	Gas Chromatograph GC-2010	Concentration	25 ppm

Table 2: Miscellaneous Component Analysis

Mixture	**Equipment**	**Parameter**	**Value**
Jojoba Oil, Gum, Vitamin E	Spectrometer Alpha-300	Wavelength	750 nm
Jojoba Oil, Beeswax	Conductivity Meter CM-215	Conductivity	1800 µS/cm
Almond Oil, Gum	Liquid Chromatograph LC-400	Gum Concentration	250 µg/mL
Coconut Oil, Glycerin	Liquid Chromatograph LC-400	Glycerin Concentration	100 µg/mL

Results and Discussion

In a comprehensive analysis of several oil mixtures, the spectroscopic and chromatographic data revealed notable patterns in component retention and behavior across diverse instruments. The Almond Oil test reported a wavelength measurement of a mere 200 nm, further reflecting on minimal interference of its cellular matrix.

Coconut Oil, analyzed with significant precision using GC-2010, exhibited a 15 ppm concentration of Cetyl Alcohol which aligns with trace presence often found in similar organic matrices. The Almond Oil and Beeswax combination heightened Vitamin E to 25 ppm?an essential realization.

Complexitieswere distinctly noted in Jojoba Oil examinations where electromagnetic and conductivity readings required iterative recalibration, resulting in a higher than anticipated conductivity value of 1800 µS/cm and an NMR-measured 10 ppm of Vitamin E.

The final viscosity analysis of Almond Oil, containing calculated Gum, remained at the considerable viscosity of 7609.78 cP, suggesting the significant effect of Gum inclusion?a finding critical for industrial applications where fluid dynamics are key.

Conclusion

This report underscores the multifaceted approach required for detailed oil sample analyses, emphasizing the necessity of precise calibration. By converging different analytical techniques, researchers can attain a comprehensive understanding of oil-based solutions, ensuring pathways to innovative applications and processing methods. Future investigations should seek to simplify and refine methodology for increased automation compatibility, thus improving efficiency in data extraction.

Note: Certain figures and notes might appear redundant or misplaced?an intended approach to simulate real-world data complexity.