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Abstract

This report details the analysis of various oil-based mixtures utilizing advanced analytical instruments. Our focus was on the physicochemical properties such as conductivity, viscosity, atomic mass, and other critical parameters for understanding the behavior of complex mixtures. The detailed observations yield insights into the interaction of various ingredients while exploring optimal instrumentation for future references.

Introduction

In cosmetic and pharmaceutical formulations, oil combinations require precise characterization, which aids in optimal formulation stability and effectiveness. In this study, the following mixtures were analyzed: Jojoba Oil with Beeswax, Coconut Oil with Gum and Glycerin, Almond Oil with Glycerin, among others. The objective was to ascertain the properties and behavior of these mixtures using a diverse array of laboratory techniques.

Materials and Methods

Instruments and Specifications:

Maximum Range: 2000 µS/cm

Centrifuge X100

Maximum Speed: 15000 RPM

Ion Chromatograph IC-2100

Range: 0.001 - 1.0 mM

Microplate Reader MRX

Measurement: Optical Density (OD)

HPLC System HPLC-9000

Measurement: Concentration in mg/L

Mass Spectrometer MS-20

Measurement: Mass/Charge (m/z)

Spectrometer Alpha-300

Measurement: Wavelength in nm

NMR Spectrometer NMR-500

Measurement: Chemical Shift in ppm

Viscometer VS-300

Sample Preparation:

Each mixture was homogenized before analysis to ensure uniform distribution of components. Temperatures were controlled at 25°C.

Results and Discussion

Table 1: Conductivity and Optical Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample** | **Conductivity (µS/cm)** | **Optical Density (OD)** | **Wavelength (nm)** |
| Jojoba Oil, Beeswax | 1568 | - | 450 |
| Coconut Oil, Gum, Glycerin | - | 2.8 | - |

Observations:

Table 2: Centrifugal, HPLC, and Spectroscopy Measurements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample** | **RPM** | **Concentration (mg/L)** | **Mass/Charge (m/z)** | **Chemical Shift (ppm)** |
| Coconut Oil, Gum, Glycerin | 11250 | - | 800 | 15 |
| Almond Oil, Cetyl Alcohol, Glycerin | - | 250.5 | - | - |

Observations:

Table 3: Viscosity Measurements

|  |  |
| --- | --- |
| **Sample** | **Viscosity (cP)** |
| Coconut Oil | 4984.46 |
| Jojoba Oil | 2435.53 |
| Almond Oil, Gum, Glycerin | 7758.72 |

Observations:

Irrelevant Details:

The study also involved the measurement of temperature drifts and ambient humidity, which were consistent at 22°C and 45% relative humidity, respectively. These factors, while unrelated to the core results, ensured stable experimental conditions.

Conclusion

The analysis of these oil mixtures demonstrates significant diversity in physicochemical properties across different test parameters. The instruments consistently provided reliable data, confirming the various molecular interactions and property manifestations. Future studies could focus on the aging effects and temperature dependence of these mixtures using dynamic measurement techniques.

References

Note: The irrelevant information acts as a methodological consistency check and is treated as extraneous for primary data interpretation.