Laboratory Report 1446

Introduction

In this report, we examine various oil-based mixtures using advanced analytical techniques, providing insights into the components' chemical properties, stability, and interactions. Each instrument is employed to assess specific attributes of the oils combined with various agents like Cetyl Alcohol, Gum, and Vitamin E.

Instrumentation and Methodology

Instruments Used

UV-Vis Spectrophotometer UV-2600

Instrument ID: UV-2600

Sample: Coconut Oil with Vitamin E

HPLC System HPLC-9000

Instrument ID: HPLC-9000

Sample: Jojoba Oil with Gum

Liquid Chromatograph LC-400

Sample: Almond Oil with Cetyl Alcohol

PCR Machine PCR-96

Sample: Jojoba Oil with Cetyl Alcohol and Vitamin E

Rheometer R-4500

Sample: Almond Oil with Cetyl Alcohol and Vitamin E

Centrifuge X100

Sample: Almond Oil with Gum

FTIR Spectrometer FTIR-8400

Sample: Jojoba Oil with Beeswax and Glycerin

Microplate Reader MRX

Sample: Coconut Oil with Cetyl Alcohol and Glycerin

NMR Spectrometer NMR-500

Sample: Jojoba Oil with Cetyl Alcohol

Viscometer VS-300

Observations and Measurements

Table 1: UV-Vis and Microplate Reader Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Mixture** | **Instrument** | **Measurement** | **Unit** |
| Coconut Oil + Vitamin E | UV-2600 | 2.8 | Abs |
| Coconut Oil + Cetyl Alcohol + Glycerin | MRX | 3.6 | OD |
| Irrelevant Data Point | - | Random | - |

Table 2: Chromatographic Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Mixture** | **Instrument** | **Concentration** | **Unit** |
| Jojoba Oil + Gum | HPLC-9000 | 450.0 | mg/L |
| Almond Oil + Cetyl Alcohol | LC-400 | 300.0 | µg/mL |
| Jojoba Oil + Cetyl Alcohol | NMR-500 | 10.0 | ppm |

Results and Discussions

The analysis of the complex mixtures revealed significant findings regarding their spectral, chromatographic, and rheological properties. The UV-Vis results indicated an absorbance of 2.8 Abs for the Coconut Oil with Vitamin E, suggesting strong interaction effects in the UV-visible region.

HPLC and NMR measurements show varied concentrations for Jojoba Oil mixtures, with significant peaks at specific retention times, indicative of pure and distinct compound separations. Jojoba Oil with Gum, measuring at 450 mg/L, implied a high solute presence within the mixture, while the 10 ppm result from the NMR spectrometer suggested minimal impurities.

The FTIR analysis on Jojoba Oil with Beeswax and Glycerin displayed major transmittance peaks at 1800 1/cm, indicating key functional group vibrations, primarily associated with carbonyl and hydroxyl stretching frequencies, which correspond to the structural components of beeswax and glycerin.

The Rheometer recorded a viscosity of 350 Pa-s for the Almond Oil with Cetyl Alcohol and Vitamin E, reflecting a viscous flow behavior. In contrasting observations, the Viscometer registered 1998.74 cP for the simple Jojoba Oil and Gum mixture, providing crucial insights into the fluid's molecular interactions.

Conclusion

The combined use of these analytical methods offers robust, multifaceted data on oil-based mixtures. Each mixture exhibited unique interaction profiles according to the choice of method and corresponding oil-solvent combinations. Further work could investigate larger datasets to explore consistency across different experimental conditions.

Appendix

Please ignore unrelated data below:

This detailed analysis demonstrates the extent of informational extraction possible through a deliberate, methodical approach realized using advanced laboratory instruments, ensuring diverse data to aid in specific component analysis.