Lab Report 2080: Analysis of Oil-Based Mixtures

Introduction

The study focuses on analyzing various oil-based mixtures using advanced laboratory instrumentation. Our aim was to understand the properties and interactions of certain mixtures containing ingredients like Jojoba Oil, Coconut Oil, and Almond Oil, each combined with other components such as Beeswax, Glycerin, and Vitamin E. Different techniques including liquid chromatography, thermocycling, spectroscopy, and viscosity measurements were employed.

Methods and Instrumentation

A variety of sophisticated instruments were used. Each sample was prepared carefully under controlled conditions to ensure accurate measurements.

Liquid Chromatography:

Thermocycling:

Microplate Reading:

NMR Spectroscopy:

Centrifugation:

Viscometry:

Results and Observations

Different combinations of oils and additives yielded diverse properties as outlined in Tables 1 and 2.

Table 1: Concentration and Thermal Data

|  |  |  |  |
| --- | --- | --- | --- |
| **Mixture** | **Instrument** | **Concentration (ug/mL)** | **Temperature (C)** |
| Jojoba Oil, Glycerin | LC-400 | 125.34 | - |
| Almond Oil, Vitamin E | LC-400 | 326.5 | - |
| Jojoba Oil, Beeswax, Vitamin E | TC-5000 | - | 45 |
| Jojoba Oil, Gum, Vitamin E | TC-5000 | - | 78 |

Table 2: Optical Density and Structural Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Mixture** | **Instrument** | **Optical Density (OD)** | **Chemical Shift (ppm)** |
| Jojoba Oil, Cetyl Alcohol, Vitamin E | MRX | 2.7 | - |
| Jojoba Oil, Gum | MRX | 1.9 | - |
| Coconut Oil, Cetyl Alcohol, Vitamin E | NMR-500 | - | 15 |

Irrelevant Information:

Sample of fluctuating patterns was observed over a period, but due to inconsistencies, detailed records are unavailable.

Table 3: Viscosity Measurements

|  |  |  |
| --- | --- | --- |
| **Mixture** | **Instrument** | **Viscosity (cP)** |
| Jojoba Oil, Gum | VS-300 | 1995.73 |
| Almond Oil, Gum | VS-300 | 7779.36 |
| Coconut Oil, Cetyl Alcohol, Vitamin E | VS-300 | 5054.99 |

Additional Notes:

Discussion

Key Findings:

The interplay between different oil bases and additives showed significant variations in both viscosity and thermal properties. The LC-400 proved useful in determining precise component concentrations, while the VS-300 was critical in understanding flow properties, indicating Almond Oil's propensity for higher viscosity when combined with Gum.

Conclusion:

Overall, the tests provided insights into the molecular interactions and stability of oil-based mixtures, guiding future formulation efforts. Irrelevant details, like observed colors and sample scents, were recorded but are not deemed significant for current analyses.

Future Work:

Research may benefit from expanded parameter ranges and incorporating solutions to eliminate irrelevant data interference, enhancing automated processing potential.

This lab report integrates all critical measurements from Report\_2080 and provides a thorough overview of the test samples' characteristics, maintaining complexity for advanced analysis.