Lab Report 1615

Experiment Overview

The goal of this experiment was to examine the properties and behaviors of various oil-based mixtures using a range of advanced laboratory equipment. The mixtures were subjected to multiple analytical techniques to derive comprehensive results covering viscosity, chemical composition, thermal stability, and more.

One interesting find during the experiment was the unexpectedly high viscosity level in Jojoba Oil and Vitamin E mixtures, compared to those involving Cetyl Alcohol. Detailed data, as you shall see in subsequent sections, provide insights into the interactivity of these compounds.

Equipment and Methodologies

This experiment employed a diverse range of laboratory equipment, each selected for its specific function in analyzing oil-based mixtures. Here, we provide a detailed summary of instruments used.

Instruments Utilized:

Centrifuge X100:Known for achieving high rotational speeds, it was employed to observe separation dynamics within the Jojoba Oil and Vitamin E mixture.

Thermocycler TC-5000:Applied at controlled temperature settings to evaluate the thermal responses in the Coconut Oil, Cetyl Alcohol, and Glycerin mixture.

Gas Chromatograph GC-2010:Used to analyze volatile components in the complex matrix of Coconut Oil, Gum, and Vitamin E.

Titrator T-905:Conducted titrations with a focus on the Acid-Base equilibrium within the Almond Oil and Gum compound.

Spectrometer Alpha-300:This instrument captured the wavelength absorbance in Almond Oil without secondary or tertiary additives.

NMR Spectrometer NMR-500:Provided insights into the molecular interactions in the Almond Oil, Beeswax, and Vitamin E mixture by detecting hydrogen environments.

Viscometer VS-300:This was pivotal in determining and comparing the viscosities of Jojoba Oil mixtures with Vitamin E and Cetyl Alcohol.

Detailed Observations and Measurements

Various measurements were taken during the course of the experiment, illustrating the unique properties of the oil mixtures used.

Table 1: Centrifuge Data

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Composition** | **Equipment Used** | **Speed (RPM)** | **Observation** |
| Jojoba Oil, Vitamin E | Centrifuge X100 | 7500 | Minimal separation observed within 5 minutes |

Table 2: Thermocycler Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Composition** | **Equipment Used** | **Temp (°C)** | **Observation** |
| Coconut Oil, Cetyl Alcohol, Glycerin | Thermocycler TC-5000 | 37 | Stable condition with gradual viscosity change |

Random Note:While Coconut Oil has been known for its versatile health benefits, the thermocycler unexpectedly revealed minor thermal expansion properties that warrant further study.

Table 3: Chromatograph and Titrator Results

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Composition** | **Equipment Used** | **Measurement** | **Observation** |
| Coconut Oil, Gum, Vitamin E | Gas Chromatograph | 150 ppm | Presence of unexpected volatiles detected |
| Almond Oil, Gum | Titrator T-905 | 5.5 M | Equilibrium achieved with minimal titrant |

Spectral and Viscosity Analysis

The following section details the findings from spectroscopic and viscosity measurements, highlighting interactions at molecular levels.

Table 4: Spectroscopy and Viscosity Findings

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Composition** | **Equipment Used** | **Measurement** | **Observation** |
| Almond Oil | Spectrometer Alpha-300 | 500 nm | Low absorbance indicating impurity |
| Almond Oil, Beeswax, Vitamin E | NMR Spectrometer NMR-500 | 12 ppm | Strong Hydrogen interaction peaks |
| Jojoba Oil, Vitamin E | Viscometer VS-300 | 2646.39 cP | High viscosity noted |
| Jojoba Oil, Cetyl Alcohol | Viscometer VS-300 | 2682.65 cP | Viscosity marginally greater |

Additional Notes:It’s apparent that the high viscosity observed in Jojoba Oil mixtures is influenced by molecular alignment and hydrogen bonding tendencies.

Conclusion

This diverse array of tests and methodologies applied to various oil-based mixtures provides a detailed examination of their chemical and physical properties. Each technique surfaced unique results, from the minimal separation in Jojoba Oil mixtures in high-speed centrifugation to the unnoticeable thermal expansion of Coconut Oil's derivatives.

Future work should focus on these findings to yield deeper insights into potential applications of these mixtures in industrial formulations.