Lab Report 346

Introduction

The focus of this report is the investigation of various mixtures utilizing different analytical techniques. A selection of oils, alcohols, waxes, and vitamins was employed to create specific formulations. These mixtures were subjected to multiple testing apparatuses to ascertain their properties and gather analytical data. The tests included measurements of conductivity, rheological characteristics, spectroscopic analysis, and structural composition.

Materials and Methods

Test Samples

Instrumentation

Results and Discussion

Conductivity Measurements

The conductivity of the formulations was assessed using the Conductivity Meter CM-215. The presence of polar substances such as Glycerin can significantly influence the readings.

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| **Mixture** | **Conductivity (uS/cm)** |
| Coconut Oil, Cetyl Alcohol, Glycerin | 1500 |
| Coconut Oil, Beeswax, Glycerin | 1750 |

...In these mixtures, Glycerin likely enhanced the ionic movement, yielding higher conductivity values. Interestingly, this contrasts with the lower conductivity in formulations devoid of Glycerin, though such data isn’t directly included here, forming a benchmark.

FTIR Spectroscopic Analysis

Using the FTIR Spectrometer FTIR-8400, we evaluated the molecular composition. Absorbance peaks help identify functional groups:

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| **Mixture** | **Wavenumber (1/cm)** |
| Almond Oil, Beeswax, Vitamin E | 3500 |
| Almond Oil, Glycerin | 1450 |

Notably, the peaks at 3500 1/cm denote hydroxyl stretching vibrations, highlighting water or alcohol presence.

Rheological Properties

Assessment through Rheometry provided insights into viscosity and elasticity. The Rheometer R-4500 data:

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| **Mixture** | **Viscosity (Pa-s)** |
| Coconut Oil, Cetyl Alcohol, Vitamin E | 500 |

Rheological data depict how added Vit E influences viscoelastic properties, showing moderate resistance to flow.

Structural Investigation

X-Ray Diffraction (XRD) was employed to determine crystallinity in singular components like Coconut Oil.

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| **Component** | **Crystalline Structure** |
| Coconut Oil | 120𝐶 |

This semi-crystalline structure suggest enhancements in certain thermal behaviors.

Mass Spectrometry Analysis

By employing the Mass Spectrometer MS-20, m/z ratios were derived to trace specific molecular fragments.

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| **Mixture** | **m/z Value** |
| Jojoba Oil, Beeswax | 800 |

The significant molecular weight indicates complex molecular associations.

Viscosity by Viscometry

The Viscometer VS-300 assessed the fluid dynamics of varied mixtures.

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| **Mixture** | **Viscosity (cP)** |
| Almond Oil, Gum, Vitamin E | 7381.48 |
| Jojoba Oil, Gum | 2071.09 |

Remarkably high viscosities were attributed to Gum's presence, demonstrating its thickening capacity.

Conclusion

The lab analysis highlights complex interactions within the different mixtures. By integrating various testing methodologies, we achieved a comprehensive understanding of each sample's physical and chemical properties. Significantly, each analytical method provided a unique vantage point, illustrating the importance of multi-faceted analytical approaches in formulation analysis.

This report further emphasizes the complexities involved in interpreting mixed data, signifying these methodologies' potential in not just scientific exploration, but product development within the cosmetic and pharmaceutical industries.