Lab Report: Analysis of Organic Compounds

Introduction

In this report, we present a comprehensive analysis of various oil-based mixtures using several advanced instruments. Each instrument was used to measure specific properties of the mixtures, comprising different combinations of substances such as Almond Oil, Jojoba Oil, Beeswax, and others. The purpose of these tests was to assess the compositional characteristics and interactions of these organic compounds. Below, we detail the findings from each instrument and discuss the implications of these results.

Instruments and Samples

Observations:

During the experiments, several unexpected interactions were noted among the mixtures. The instrument measurements varied based on the complexity of the sample matrix. Let's delve into the sample-specific results obtained using each device.

Results and Discussion

Table 1: Ion Chromatograph Measurements

|  |  |  |
| --- | --- | --- |
| **Sample Mixture** | **Measurement** | **Unit** |
| Almond Oil, Beeswax | 50.5 | mM |
| Almond Oil, Vitamin E | 75.0 | mM |

For theIon Chromatograph IC-2100, the almond oil mixture exhibited substantial ion concentration, with the inclusion of Vitamin E resulting in a higher measurement. This increase suggests potential ionic interactions enhancing the mix's conductivity.

Table 2: FTIR Spectrometer Data

|  |  |  |
| --- | --- | --- |
| **Sample Mixture** | **Wavelength** | **Unit** |
| Coconut Oil | 2500 | 1/cm |
| Coconut Oil, Glycerin | 3200 | 1/cm |

TheFTIR Spectrometer FTIR-8400detected peaks at 2500 1/cm for pure coconut oil and shifted to 3200 1/cm with glycerin. This shift indicates additional hydrogen bonding or molecular interactions due to glycerin's presence.

Table 3: Mass and Liquid Chromatograph Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Instrument** | **Sample Mixture** | **Measurement** | **Unit** |
| Mass Spectrometer MS-20 | Almond Oil | 150.0 | m/z |
| Liquid Chromatograph LC-400 | Jojoba Oil, Gum, Glycerin | 85.3 | ug/mL |

Unique molecular weight (150 m/z) of almond oil was identified using theMass Spectrometer MS-20. In contrast, theLiquid Chromatograph LC-400detected concentration variations in the jojoba oil compound, attributed to its complex mix with gum and glycerin.

Table 4: Viscometric and Mechanical Observations

|  |  |  |
| --- | --- | --- |
| **Sample Mixture** | **Measurement** | **Unit** |
| Coconut Oil, Cetyl Alcohol, Glycerin | 5270.93 | cP |
| Jojoba Oil, Cetyl Alcohol, Glycerin | 0.75 | mm |

Utilizing both theViscometer VS-300andFour Ball FB-1000, we observed high viscosity in coconut mixtures and measured frictional wear with jojoba oil, implying its viscosity reducing mechanical stress.

Titration Analysis:

Using theTitrator T-905, we determined the molarity of jojoba oil mixed with beeswax (5.2 M), indicating strong acidic properties possibly enhanced by beeswax's emulsifying nature.

Conclusion

The analysis highlights complex interactions and variance among the tested oil mixes. Each device yielded crucial insights into the molecular and chemical properties of these substances. Future investigations may further explore mixed compound interactions under varying environmental conditions.

Appendix

This report captures a snapshot of extensive testing processes, showcasing the intricate nature of organic compound interactions.