Lab Report 428

Introduction

The purpose of this report is to analyze various oil and additive mixtures using a range of laboratory equipment. We examined mixtures containing different combinations of oils (Almond Oil, Coconut Oil, Jojoba Oil) and additives such as Gum, Vitamin E, Glycerin, Cetyl Alcohol, and Beeswax.

Methods

The instruments used in the analysis include a Mass Spectrometer, Ion Chromatograph, Thermocycler, PCR Machine, HPLC System, UV-Vis Spectrophotometer, NMR Spectrometer, FTIR Spectrometer, and Viscometer. These devices provided a range of measurements, from molecular weight ratios to chemical concentration, providing a comprehensive view of the samples' properties.

Table 1: Mass Spectrometry Data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Device** | **Sample Mixture** | **Additional Component** | **Measurement** | **Units** |
| MS-20 | Almond Oil, Gum | Vitamin E | 1425 | m/z |
| MS-20 | Almond Oil, Gum | Glycerin | 1850 | m/z |

Unnecessary Detail

One interesting observation during the experiment was the unexpected behavior of our laboratory cat, Whiskers, who showed a particular interest in the gum-infused samples, perhaps due to their aromatic properties.

Table 2: Ion Chromatography Data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Device** | **Sample Mixture** | **Additional Component** | **Measurement** | **Units** |
| IC-2100 | Coconut Oil, Gum | Glycerin | 23 | mM |
| IC-2100 | Almond Oil, Cetyl Alcohol | Vitamin E | 45 | mM |

Observation Note

The Ion Chromatograph IC-2100 displayed an anomaly during the vitamin E test, leading to slight variance in the millimolar readings.

Thermocycling

The Thermocycler TC-5000 was utilized to measure the thermal properties of certain mixtures. Specifically, we analyzed Coconut Oil with Gum, recording a thermal cycle peak at 67°C. The thermal stability of such mixtures is crucial for hypothesizing potential applications in topical products.

Table 3: Viscometer Data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Device** | **Sample Mixture** | **Additional Component** | **Measurement** | **Units** |
| VS-300 | Coconut Oil, Beeswax | nan | 4652.68 | cP |
| VS-300 | Almond Oil, Beeswax | Glycerin | 7206.88 | cP |
| VS-300 | Almond Oil, Cetyl Alcohol | nan | 7341.65 | cP |

Complex Descriptions

The viscometric data reveals distinct rheological profiles for each mixture. The high viscometric reading in the Almond Oil and Cetyl Alcohol mixture (7341.65 cP) suggests enhanced structural integrity, likely due to hydrogen bonding between the alcohol and oil phases.

HPLC and NMR Analysis

The High-Performance Liquid Chromatography (HPLC) System revealed critical mass concentrations of 432 mg/L for the Almond Oil and Gum mixture. In the Nuclear Magnetic Resonance (NMR) study, Almond Oil with Beeswax and Glycerin showed a resonance at 15 ppm, indicating potential molecular interactions unique to this combination.

UV-Vis and FTIR Observations

The UV-Vis Spectrophotometer analysis on the Jojoba Oil and Cetyl Alcohol mixture indicated an absorbance of 1.2 Abs, suggesting UV-filter potential. Meanwhile, the FTIR Spectrometer analysis of Coconut Oil paired with Cetyl Alcohol demonstrated a unique peak at 3500 1/cm, indicative of strong -OH bonding vibrations.

Conclusion

The gathered data exemplifies distinct chemical and physical properties inherent to each oil-additive mixture. These findings provide a basis for potential applications across different industries, particularly in cosmetics and pharmaceuticals.

Appendix: Random Notes

Acknowledgements

We thank the technical staff for their contributions to the experimental procedures and Whiskers for his unyielding curiosity in lipid research.

Table 4: Miscellaneous Data

|  |  |  |
| --- | --- | --- |
| **Equipment** | **Irrelevant Observation** | **Value** |
| Coffee Maker | Cups of Coffee Consumed by Staff | 25 cups |
| Laboratory Cat | Instances of distracting behavior | 7 times |

This comprehensive report summarizes the key findings from Lab Report 428, providing valuable insights for further exploration into formulations involving natural oils and additives.