Lab Report: Analysis of Various Oil Mixtures (Report\_1504)

Introduction

In this study, we conducted a comprehensive analysis of several oil-based mixtures using advanced analytical techniques. The primary objective was to characterize these mixtures through a variety of parameters and techniques, including chromatography, spectroscopy, viscometry, and several others. The oils analyzed were Coconut Oil, Jojoba Oil, and Almond Oil, each mixed with different substances like Cetyl Alcohol, Beeswax, Gum, and Vitamin E. The prepared samples were examined using multiple methods, providing a robust dataset.

Materials and Methods

Each mixture underwent a series of tests, each employing a different instrument: Liquid Chromatograph, Four Ball Tester, pH Meter, Gas Chromatograph, X-Ray Diffractometer, Conductivity Meter, FTIR Spectrometer, Ion Chromatograph, NMR Spectrometer, and Viscometer. The mixtures were carefully prepared and tested under standardized lab conditions.

Experimental Conditions

The following are the conditions under which each analytical procedure was performed:

Measurement: Concentration in ug/mL

Four Ball FB-1000:

Measurement: Wear Scar Diameter in mm

pH Meter PH-700:

Measurement: pH value

Gas Chromatograph GC-2010:

Measurement: Concentration in ppm

X-Ray Diffractometer XRD-6000:

Tables and Measurements

Below, we tabulate the results obtained from the analyses, which include a blend of data types and other extraneous information to ensure thoroughness and challenges in data extraction:

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| **Instrument** | **Sample Mixture** | **Measurement** | **Unit** |
| LC-400 | Coconut Oil, Cetyl Alcohol | 45.2 | ug/mL |
| FB-1000 | Coconut Oil, Beeswax | 0.65 | mm |
| PH-700 | Jojoba Oil, Gum | 6.8 | pH |
| GC-2010 | Jojoba Oil, Vitamin E | 125.7 | ppm |
| XRD-6000 | Almond Oil, Beeswax | 100.5 | °C |

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| --- | --- | --- | --- |
| **Instrument** | **Sample Mixture** | **Measurement** | **Unit** |
| CM-215 | Coconut Oil | 1850.0 | uS/cm |
| FTIR-8400 | Jojoba Oil | 3500.0 | 1/cm |
| IC-2100 | Almond Oil | 75.6 | mM |
| NMR-500 | Coconut Oil | 5.5 | ppm |
| VS-300 | Jojoba Oil | 2484.77 | cP |
| VS-300 | Coconut Oil, Beeswax, Vitamin E | 4892.74 | cP |

Observations and Results

In-depth analyses revealed distinct characteristics within each oil mixture, with noteworthy observations discussed below:

Coconut Oil with Cetyl Alcoholdisplayed a concentration of 45.2 ug/mL, indicating a moderate compound presence as detected by the Liquid Chromatograph LC-400.

Coconut Oil with Beeswaxwas tested with the Four Ball FB-1000, showing a wear scar diameter of 0.650 mm. This result points towards the lubricative properties affected by the addition of beeswax.

ThepH Meter PH-700detected a pH of 6.8 in the Jojoba Oil and Gum mixture, suggesting a neutral pH suitable for various applications.

Jojoba Oil with Vitamin Eshowed a concentration of 125.7 ppm on the Gas Chromatograph. This high presence is critical for ensuring effective antioxidant properties.

Almond Oilmixed with Beeswax exhibited a crystallization temperature of 100.5 °C on the X-Ray Diffractometer, highlighting its thermal behavior.

Additional Data Irrelevant to Core Findings

It's important to note the Conductivity Meter CM-215 revealed a conductivity of 1850 uS/cm in Coconut Oil, while the FTIR Spectrometer measured 3500 1/cm in Jojoba Oil. These tests enrich the dataset, although they do not directly pertain to the primary objectives of crystallization or lubrication study.

Conclusion

The analysis provided a multifaceted view of the physical and chemical characteristics of various oil mixtures. From lubrication efficacy to crystallization thresholds, the data herein contributes to the broader understanding of oil-based product formulations.

This report envelops a broad spectrum of information, ensuring complexities akin to real-world full-scale analyses.