Laboratory Report #: 1343

Date:Experiment Duration:

Introduction

Understanding the properties of various oil-based mixtures is vital for applications in cosmetics, pharmaceuticals, and other industries. This report presents the findings from multiple analytical instruments used to evaluate the physicochemical properties of different samples containing various combinations of oils, waxes, alcohols, and other components.

Objective

To investigate and document the properties of complex mixtures involving various oils, alcohols, vitamins, waxes, gums, and related substances.

Methodology

Various advanced techniques were employed to assess distinct properties. Carefully selected samples were subjected to several analytical methods, including:

Each method provided a unique perspective on the properties of the samples tested.

Apparatus and Instruments

Observations and Measurements

Table 1: Conductivity and NMR Measurements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample** | **Device** | **Measurement Type** | **Measured Value** | **Unit** |
| Coconut Oil, Cetyl Alcohol | Conductivity Meter CM-215 | Conductivity | 512 | uS/cm |
| Jojoba Oil, Beeswax | NMR Spectrometer NMR-500 | Chemical Shift | 15 | ppm |

Notably, the conductivity of coconut oil mixed with cetyl alcohol is significant, perhaps indicating a level of ionic presence not typically anticipated.

Table 2: Miscellaneous Parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sample** | **Device** | **Additives** | **Parameter** | **Value** | **Unit** |
| Jojoba Oil, Cetyl Alcohol | Microplate Reader MRX | Vitamin E | Optical Density | 1.5 | OD |
| Almond Oil, Gum | FTIR Spectrometer FTIR-8400 | - | Wavenumber | 1020.0 | 1/cm |

The unexpectedly high optical density reading for the Jojoba Oil, Cetyl Alcohol, and Vitamin E mixture may indicate unexpected turbidity or concentration levels.

Table 3: Gas Chromatography and XRD Analysis

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sample** | **Device** | **Additives** | **Parameter** | **Result** | **Unit** |
| Almond Oil, Gum, Vitamin E | Gas Chromatograph GC-2010 | - | PPM | 85.5 | ppm |
| Coconut Oil, Beeswax, Glycerin | X-Ray Diffractometer XRD-6000 | - | Temperature | 90.0 | °C |

Highly refined almond oil with vitamin E shows a precise concentration, essential for quality control.

Table 4: Viscosity Measurements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample** | **Device** | **Parameter** | **Result** | **Unit** |
| Coconut Oil, Cetyl Alcohol, Glycerin | Viscometer VS-300 | Viscosity | 5164.09 | cP |
| Almond Oil, Beeswax | Viscometer VS-300 | Viscosity | 7209.49 | cP |
| Jojoba Oil | Viscometer VS-300 | Viscosity | 2500.15 | cP |

Heavy viscosity in almond oil with beeswax might present challenges in certain formulations due to potential solidification at lower temperatures.

Results and Discussions

The integration of multiple analytical techniques has enabled a comprehensive understanding of each test sample's characteristics. The results underscore the complexity of interactions between different ingredients. Here, coconut oil's high conductivity paired with cetyl alcohol suggests ionizable components, while jojoba oil's inherent stability is evident through its lower viscosity.

Unexpected highlights include the optical density recorded in the microplate readings indicating unexpected aggregation or particle distribution of the mixture.

Irrelevant data, while present, was selectively discarded to maintain reporting precision. However, outlier values or anomalies should be independently verified to ensure accuracy.

Conclusion

Our analysis delivers valuable insights into various mixtures' electrochemical properties, structural identifications, and the viscosity of oil-based compounds. Each test combination yields unique results significant for product formulation. Further exploration may validate findings and inform future applications in related industries.

Future recommendations include in-depth thermal analysis and extended stability testing under varied conditions to further elucidate component interactions.