Laboratory Report: Analysis of Various Oil Mixtures

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Introduction

The purpose of this laboratory analysis is to characterize and evaluate the physical and chemical properties of various oil mixtures using a range of sophisticated analytical instruments. The mixtures consist of different oils, waxes, and other ingredients, with each combination undergoing specific tests pertinent to its unique attributes.

Materials and Methods

The following tests were conducted on twelve distinct oil and additional ingredient combinations as outlined below. Each set of test results is associated with a specific instrument, and results were recorded accordingly.

Table 1:Test Instruments and Measurements

|  |  |  |  |
| --- | --- | --- | --- |
| **Instrument** | **Mixture** | **Measurement** | **Units** |
| Four Ball FB-1000 | Jojoba Oil, Gum, Vitamin E | 0.650 | mm |
| HPLC System HPLC-9000 | Almond Oil, Beeswax, Glycerin | 453.25 | mg/L |
| Mass Spectrometer MS-20 | Coconut Oil, Cetyl Alcohol, Glycerin | 1250 | m/z |
| Liquid Chromatograph LC-400 | Jojoba Oil, Beeswax, Glycerin | 47.35 | µg/mL |
| X-Ray Diffractometer XRD-6000 | Almond Oil, Cetyl Alcohol | 140 | °C |
| FTIR Spectrometer FTIR-8400 | Jojoba Oil, Gum, Glycerin | 2100 | 1/cm |
| Spectrometer Alpha-300 | Coconut Oil, Cetyl Alcohol, Glycerin | 750 | nm |
| Titrator T-905 | Jojoba Oil, Beeswax | 6.25 | M |
| Rheometer R-4500 | Almond Oil, Beeswax, Glycerin | 320 | Pa-s |
| UV-Vis Spectrophotometer UV-2600 | Jojoba Oil, Gum, Vitamin E | 1.75 | Abs |
| Viscometer VS-300 | Almond Oil, Gum, Vitamin E | 7492.76 & 7705.32 | cP |

Observations

Section A: Mixture Characteristics

Appeared amber with a smooth texture. Absorbance peaked at 1.75 Abs under UV-Vis conditions.

Almond Oil, Beeswax, Glycerin:

Section B: Instrumental Analysis

FTIR Spectrometer FTIR-8400:The Jojoba Oil, Gum, and Glycerin mixture revealed significant absorbance at 2100 1/cm, suggestive of a double-bond presence, dominant in gum-based oils.

Mass Spectrometer MS-20:Coconut Oil, Cetyl Alcohol, and Glycerin peaked significantly around 1250 m/z, indicating molecular ion fragmentation consistent with fatty acid derivatives.

Viscometer VS-300:The Almond Oil, Gum, and Vitamin E mixture displayed an intriguing shear thinning behavior, with results of 7492.76 cP and 7705.32 cP across multiple trials.

Results

Table 2:Detailed Instrumental Data

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample ID** | **Irrelevant Information** | **Core Measurement** | **Notes** |
| A001 | nan | 0.650 mm | Elasticity level - Jojoba Oil, Gum, Vitamin E |
| A002 | R34-Q4T-P | 453.25 mg/L | HPLC peak area - Almond Oil, Beeswax, Glycerin |
| A003 | v5c9-yH2-zPq | 1250 m/z | Coconut derivative peak |
| A004 | 457-G7 | 47.35 µg/mL | Chromatographic analysis - Jojoba variant |
| A005 | Section 932 | 140 °C | X-Ray Diffraction temperature - Almond mixture |
| A006 | Unused | 6.25 M | Titration concentration - Jojoba derivative |

Complex Descriptions

In the use ofX-Ray Diffractometer XRD-6000, significant structural alterations were perceived at 140°C within the Almond Oil and Cetyl Alcohol compound. The crystallographic shifts are presumed to recognize transitions in molecular configurations.

Notably, theSpectrometer Alpha-300employed for aqueous dispersions deduced the spectral bands due to electronic transitions, spotting an emission at 750 nm distinctly.

Conclusion

The analyses carried out on different mixtures utilizing a diversity of advanced analytical tools have provided insight into the molecular intricacies and physical properties of each combination. This comprehensive evaluation reinforces the understanding required to optimize these mixtures for industrial applications.

Data variances among trials, such as within the viscometric analyses, will necessitate further iterative testing to ensure data reliability. Continuous refinement of protocol design and error mitigation strategies is advised to enhance accuracy in future experiments.