Lab Report: Analysis of Various Oil Mixtures - Report\_493

Introduction

This report details the experimental analysis conducted on various oil mixtures using a range of sophisticated instruments. The samples include combinations of natural oils and additives such as Vitamin E, glycerin, gums, cetyl alcohol, and beeswax. Each sample was analyzed using different parameters to understand their physical and chemical properties, harnessed from the following techniques: UV-Vis Spectrophotometry, Microplate Reader, FTIR, NMR, pH assessment, and viscosity measurement.

Overview of Instruments

Methodology

The samples are mixtures composed of two or more ingredients, treated as a single entity during testing. All instruments were calibrated to standard specifications prior to sample analysis. The ambient temperature was maintained at 25°C, ensuring consistent results across tests.

Observations and Results

Table 1: Spectroscopic Analysis

|  |  |  |
| --- | --- | --- |
| **Instrument** | **Sample Composition** | **Measurements/Results** |
| UV-Vis Spectrophotometer UV-2600 | Jojoba Oil | 3.2 Abs |
| UV-Vis Spectrophotometer UV-2600 | Almond Oil | 2.5 Abs |
| Microplate Reader MRX | Jojoba Oil, Vitamin E | 2.8 OD |
| Microplate Reader MRX | Coconut Oil, Gum, Vitamin E | 3.7 OD |

Table 2: pH and FTIR Analysis

|  |  |  |
| --- | --- | --- |
| **Instrument** | **Sample Composition** | **Measurements/Results** |
| pH Meter PH-700 | Coconut Oil, Gum | 8.1 pH |
| FTIR Spectrometer FTIR-8400 | Almond Oil, Gum, Glycerin | 1500 1/cm |

Viscosity and NMR Results

Through complex analysis, the viscosity of mixtures was recorded using dynamic fluid viscosity principles.

Table 3: Viscosity Measurements

|  |  |  |
| --- | --- | --- |
| **Instrument** | **Sample Composition** | **Viscosity (cP)** |
| Viscometer VS-300 | Almond Oil, Cetyl Alcohol, Vitamin E | 7220.33 cP |
| Viscometer VS-300 | Coconut Oil, Beeswax, Vitamin E | 4717.73 cP |
| Viscometer VS-300 | Jojoba Oil, Vitamin E | 2699.14 cP |

Additional Measurement:

Discussion

Among the samples analyzed, theabsorptive and optical propertiesvaried widely. Jojoba Oil notably induced a baseline absorbance at around 3.2 Abs, consistent with its high unsaturated ester content.

Theviscosity measuresshowed an intriguing hierarchy, where the coconut oil mixtures demonstrated moderate fluidity compared to other mixtures. This may be attributed to beeswax's structural integrity and interaction with the fatty acids present in the oils.

ThepH analysisindicated a relatively stable basic nature for the mixture involving coconut oil and gum, reflecting the non-reactive nature of the constituents in aqueous conditions.

FTIR analysis identifiedcharacteristic peaksat 1500 1/cm, clearly marking the presence of specific functional groups in almond oil and its additives, providing insights into possible applications in cosmetic formulation.

Conclusion

The comprehensive analysis of these oil-based mixtures using various spectroscopic, chemical, and physical methods provides a multi-faceted understanding of their characteristics. The findings suggest diverse applications ranging from emulsification agents to potential skin protection solutions, served by the chemical profiles elucidated through these analyses.

Miscellaneous Observations

This report provides a detailed insight into the intricate compositions and their potential implications, reflecting the need for further targeted analysis depending on specific application needs.