Laboratory Report: Analysis of Various Oil Mixtures

Introduction

This detailed laboratory report focuses on the analysis of different oil-based mixtures using multiple analytical instruments. Each mixture was subjected to a suite of tests to determine various chemical and physical properties. The mixtures analyzed include combinations of oils, gums, and other additives.

Experimental Procedures

Test Samples

Instrumentation and Methods

1.Thermocycler TC-5000

Tested temperature cycling characteristics ofJojoba Oil.-Range: [4-99] C-Observation: The sample maintained stability over multiple cycles within the specified range.

2.Spectrometer Alpha-300

AnalyzedAlmond Oilfor spectral characteristics.-Range: [190-1100] nm-Observation: Peak absorbance observed around 210 nm, indicating likely presence of specific fatty acids.

3.Liquid Chromatograph LC-400

Conducted separation of components inJojoba Oil and Gummixture.-Range: [0.01-500] μg/mL-Observation: Efficient separation with peaks noted for both major components.

4.FTIR Spectrometer FTIR-8400

Identified functional groups inCoconut Oil and Beeswax.-Range: [400-4000] 1/cm-Observation: Characteristic peaks indicated presence of ester linkages.

Results and Analysis

Table 1: Mixture Composition and Initial Observations

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample #** | **Composition** | **Instrument Used** | **Observation** |
| 1 | Jojoba Oil, Beeswax, Vitamin E | FTIR Spectrometer | Presence of ester linkages |
| 2 | Almond Oil, Glycerin, Gum | Spectrometer Alpha-300 | Peak absorbance at 210 nm |
| 3 | Coconut Oil, Gum, Vitamin E | Viscometer VS-300 | Viscosity: 5271.6 cP |
| 4 | Jojoba Oil, Cetyl Alcohol | Rheometer R-4500 | Dynamic range: 0.1-1000 Pa-s |

Table 2: Advanced Analytical Measurements

|  |  |  |  |
| --- | --- | --- | --- |
| **Instrument** | **Measurement Type** | **Units** | **Data** |
| Mass Spectrometer MS-20 | m/z Ratio | m/z | [50-2000] |
| NMR Spectrometer NMR-500 | Chemical Shift | ppm | [0-20] |
| Gas Chromatograph GC-2010 | Concentration | ppm | [0.1-1000] |
| PCR Machine PCR-96 | Cycle Threshold (Ct) | Ct | [0-40] |
| pH Meter PH-700 | pH Level | pH | [0-14] |

Observations and Measurements

The analysis of each mixture revealed the following:

Sample 1(Jojoba Oil, Beeswax, Vitamin E): Analysis via the FTIR spectrometer showed distinct peaks confirming ester functional groups. The compound remained stable across thermal cycling as observed with the thermocycler.

Sample 2(Almond Oil, Glycerin, Gum): Utilization of the spectrometer highlighted spectral characteristics around 210 nm, indicative of fatty acids, and the viscometer revealed a viscosity of 7685.63 cP.

Sample 3(Coconut Oil, Gum, Vitamin E): The viscosity measured at 5271.6 cP using the viscometer, signifying a moderately viscous nature consistent with known viscosities of such mixtures.

Sample 4(Jojoba Oil, Cetyl Alcohol): Rheological properties showcase a wide dynamic range evident from testing with the rheometer.

Conclusion

The comprehensive analysis of these oils and their mixtures provide valuable insights into their chemical and physical properties. This report outlines the rigorous testing undertaken using diverse instruments. Despite certain mixtures exhibiting unique characteristics, commonalities such as specific absorbance and viscosity profiles were observed across different samples.

Random Note: The climate in the lab was consistently maintained at 22°C.

This report, while detailed, demonstrates the necessity of careful interpretation and processing of the data collected from various instruments. The integration of differing analytical methods ensures a thorough understanding of each mixture's properties, offering valuable information that could be leveraged for further research and development applications.