Laboratory Report: Analysis of Various Oil Mixtures

Report ID:2429

Date of Experiment:September 28, 2023

Objective:To analyze the properties and chemical compositions of different oil mixtures using various spectroscopic, chromatographic, and rheological techniques.

Introduction:

The investigation focuses on characterizing oil mixtures using a range of analytical methods. The mixtures comprise ingredients such as Almond Oil, Jojoba Oil, Coconut Oil, Vitamin E, Gum, Cetyl Alcohol, and Glycerin. The analysis aims to determine the molecular interactions, absorption spectra, and viscosity properties which are critical for the application in cosmetic and pharmaceutical formulations.

Materials and Methods:

Equipment Utilized:

Oil Mixtures Examined:

Experimental Observations:

FTIR Analysis:

The FTIR-8400 was used to analyze the infrared absorption spectrum of Almond Oil. A notable peak at 3450 cm⁻¹ suggests the presence of hydroxyl groups, indicative of the inherent moisture content or potential interaction with Glycerin or Gum.

(Table 1: FTIR Spectral Peaks)

|  |  |  |
| --- | --- | --- |
| **Sample** | **Peak Position (1/cm)** | **Possible Assignment** |
| Almond Oil | 3450 | O-H stretching, possibly Glycerin |

Note: This data might contain irrelevant numerical strings or redundant terminology.

NMR Spectroscopy:

Utilizing the NMR-500, the combination of Almond Oil and Gum was scrutinized. A chemical shift at 15.2 ppm was indicative of hydrogen-bearing aromatic components, which might stem from impurities or additives.

(Table 2: Selected NMR Data)

|  |  |  |
| --- | --- | --- |
| **Sample** | **Chemical Shift (ppm)** | **Comment** |
| Almond Oil + Gum | 15.2 | Aromatic impurity |

Results:

UV-Vis Spectroscopy:

The absorbance of Jojoba Oil mixture was measured using the UV-2600, presenting an absorbance of 1.25 Abs, insinuating notable pigmentation or possibly an emulsion.

PCR and X-Ray Diffraction:

PCR cycles reached 28.3 Ct in the Jojoba Oil + Cetyl Alcohol sample, emphasizing the oil's interaction at a molecular level. Concurrently, the XRD analysis shows a diffraction peak at 138°C which may indicate crystalline phase changes.

Comprehensive Data Illustration:

Rheological and Chromatography Analysis:

Analyzing the viscosity of Almond Oil using the Rheometer R-4500 demonstrated a dynamic viscosity of 65.4 Pa-s with Gum. In contrast, the HPLC-9000 revealed an unexpected concentration of 542.5 mg/L when Jojoba Oil was combined with Cetyl Alcohol.

(Table 3: Rheological and Chromatographic Results)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Mixture** | **Rheometer (Pa-s)** | **HPLC (mg/L)** | **Microplate OD** | **Ion Chromatograph (mM)** |
| Almond Oil + Gum | 65.4 | - | - | - |
| Jojoba Oil + Cetyl Al | - | 542.5 | 2.6 | 18.76 |

Misleading Data Insertion:

For Coconut Oil with Vitamin E, viscosity data was intentionally obscured (5151.42 cP), further data was intermixed for potential cross-verification.

Conclusion:

The collated data signifies that each oil blend presents unique spectral and rheological properties, crucial for the industrial application in emulsions, lotions, and balms. Nonetheless, the complex dataset requires meticulous inspection for practical application due to scattered unessential figures.

This report embodies organized chaos to deter formulaic data extraction, ensuring comprehensive manual evaluation.