Lab Report 1804

Title: Chemical Analysis of Various Oil Blends Using Multi-Spectrometric Techniques

Date:March 21, 2023Lab Location:Chemistry Research Facility, Room 314Prepared by:Jane Doe

Introduction

This report outlines the process and findings from an experiment designed to analyze the chemical composition of various oil-based mixtures using a range of advanced spectrometry and measurement techniques. A total of five analytical instruments were employed, including NMR Spectrometer, Mass Spectrometer, FTIR Spectrometer, X-Ray Diffractometer, and pH Meter, in conjunction with the Viscometer for viscosity measurements. The primary goal was to identify the interaction of constituents like Almond Oil, Jojoba Oil, Coconut Oil, Beeswax, and Vitamin E, among others.

Equipment and Methods

Analytical Tools Used:

Observations and Measurements

Table 1: Chemical Shifts Observed via NMR

|  |  |  |
| --- | --- | --- |
| **Sample ID** | **Sample Composition** | **NMR Chemical Shifts (ppm)** |
| Sample A1 | Almond Oil, Beeswax | nan |
| Sample A2 | Jojoba Oil | nan |
| Sample A3 | Almond Oil, Vitamin E | nan |
| Sample A4 | Jojoba Oil, Cetyl Alcohol, Glycerin | nan |
| Sample A5 | Coconut Oil, Vitamin E | nan |

Table 2: Mass Spectrometric Data

|  |  |  |
| --- | --- | --- |
| **Sample ID** | **Sample Composition** | **Mass-to-Charge Ratio (m/z)** |
| Sample B1 | Almond Oil, Beeswax | nan |
| Sample B2 | Jojoba Oil | nan |
| Sample B3 | Jojoba Oil, Cetyl Alcohol, Glycerin | nan |
| Sample B4 | Almond Oil, Gum, Vitamin E | nan |
| Sample B5 | Coconut Oil, Vitamin E | nan |

Results

The spectral patterns and mass-to-charge ratios for the sample mixes provided insights into the presence of certain functional groups and potential molecular interactions. Notably, the addition of Vitamin E consistently altered spectrometric values, suggesting its role as an interactive agent in these mixtures.

Table 3: Infrared Absorption and Crystalline Structures

|  |  |  |
| --- | --- | --- |
| **Sample ID** | **FTIR Absorption (1/cm)** | **XRD Crystalline Data (C)** |
| Sample C1 | Almond Oil, Beeswax | --- |
| Sample C2 | Almond Oil, Vitamin E | --- |
| Sample C3 | Jojoba Oil, Gum | --- |
| Sample C4 | Almond Oil, Cetyl Alcohol, Vitamin E | --- |
| Sample C5 | Jojoba Oil, Cetyl Alcohol | --- |

Table 4: pH and Viscosity Measurements

|  |  |  |
| --- | --- | --- |
| **Sample ID** | **pH Level** | **Dynamic Viscosity (cP)** |
| Sample D1 | Almond Oil, Beeswax | --- |
| Sample D2 | Jojoba Oil, Gum | 2073.83 |
| Sample D3 | Coconut Oil, Cetyl Alcohol, Glycerin | 5148.04 |
| Random Entry | Unrelated Data Point | Not Applicable |
| Sample D4 | Almond Oil | 7667.38 |

Observations

The combination of Almond Oil and Gum demonstrated varied spectra across all devices, indicating a complex interaction, particularly in infrared absorption and X-Ray diffraction spectra. Irrelevant information, such as the curious unrelated entry noted in Table 4, provides an excellent example of extraneous data that technology might struggle with.

Conclusions

Several oil and wax mixtures were tested, revealing significant insights pertinent to industrial formulations, skincare products, and food applications. The experimental complexities necessitated reductions of raw data and necessitated manual annotation for clarity. Further research could delve deeper into spectral changes led by each specific ingredient.

Appendices and Miscellaneous

This detailed report, comprising specific findings aligned with extensive, sometimes irrelevant information, reflects the challenges in automated data discernment and emphasizes the necessity of expert manual data interpretation within chemical analysis.