Laboratory Report

Project ID: Report\_68

Experiment Overview

This report documents the findings from various analytical tests conducted on specific oil mixtures using an array of advanced instrumentation. The primary mixtures tested were based on Almond Oil and Jojoba Oil, combined with various additives like Gum and Cetyl Alcohol. Each set of ingredients was treated as a unique test sample and analyzed via different techniques to determine their chemical and physical properties.

Test Samples:

Methodology

Instruments and Techniques Used

The following instruments were utilized, providing diverse data types for comprehensive analysis:

Observations and Results

Table 1: Spectroscopic and Chromatographic Analysis

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Instrument** | **Sample** | **Major Component** | **Minor Component** | **Observed Value** | **Unit** |
| UV-2600 | A | Almond Oil | Gum | 2.1 | Abs |
| IC-2100 | B | Almond Oil | - | 45.3 | mM |
| NMR-500 | D | Jojoba Oil | Cetyl Alcohol | 10.5 | ppm |

Detailed Experimentation

Mass Spectrometry Analysis

Sample C, which includes Almond Oil, Cetyl Alcohol, and Glycerin, was subjected to MS-20 analysis. The mass-to-charge ratio, denoted as750 m/z, was a key indicator, suggesting significant chemical interactions and possible compound formations within the oil mixture.

Sample D underwent further refinement using an NMR Spectrometer, revealing a ppm value of 10.5, indicative of specific hydrogen environments within the Cetyl Alcohol component mixed with Jojoba Oil, further appreciating the molecular weight variations in the blend.

Table 2: Thermal and Structural Investigations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Instrument** | **Sample** | **Major Component** | **Minor Component** | **Measured Value** | **Unit** |
| TC-5000 | A | Almond Oil | Gum | 72 | °C |
| XRD-6000 | C | Almond Oil | Cetyl Alcohol | 145 | °C |

Additional Notes

A thermocycler was utilized for Sample A, heating the Almond Oil and Gum mixture to72°Cinducing thermal transitions that could affect viscosity and interaction properties. The X-Ray Diffractometer results for Sample C were complex, with a crystalline temperature noted at145°C, potentially due to alignment shifts in Cetyl Alcohol.

Additionally, in Table 3 below, the four-ball test described the lubrication properties as Almond Oil interacted with other components.

Table 3: Mechanical and Chemical Testing

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Instrument** | **Sample** | **Lubricant Component** | **Observed Friction** | **Unit** |
| FB-1000 | C | Almond Oil + Glycerin | 0.6 | mm |
| LC-400 | B | Almond Oil | 285.0 | µg/mL |

The four-ball tester showed a wear scar diameter of0.600 mm, emphasizing the lubricating efficiency of this oil mixture.

Miscellaneous Information

During the titration process for Sample D utilizing T-905, a molarity value of3.5 Mwas recorded. It's crucial to reiterate that throughout the entire set of experiments, unexpected observations were diligently noted, such as sporadic temperature fluctuations and pressure adjustments, although these were not consistently aligned with the primary data objectives.

Conclusion

The data infer varied interactions within each sample, highlighting the complex nature of oil mixtures. The study enriches our understanding of chemical and mechanical attributes, paving pathways for enhanced applications in lubrication and material science.