Lab Report: Analysis of Oil Mixtures

Introduction

The purpose of this experiment was to evaluate the properties of various oil mixtures using different analytical instruments. We tested the interactions and characteristics of the mixtures using multiple methods, including spectroscopy, rheometry, and viscometry.

Materials and Methods

Various oil mixtures were prepared and analyzed using the following instruments:

The oil mixtures were composed using combinations ofAlmond Oil,Coconut Oil,Jojoba Oil, along withCetyl Alcohol,Gum,Beeswax,Glycerin, andVitamin E.

Test Samples

Measurement Methods

1. Spectroscopy

Objective:Measure the absorption characteristics.

Instrument:Spectrometer Alpha-300

2. Conductivity

Objective:Determine the ability of the mixture to conduct electric current.

Instrument:Conductivity Meter CM-215

3. Centrifugation

Objective:Assess phase separation speed.

Instrument:Centrifuge X100

4. Rheometry

Objective:Evaluate the viscoelastic properties.

Instrument:Rheometer R-4500

5. Wear Testing

Objective:Test the lubricity or friction reduction.

Instrument:Four Ball FB-1000

6. Viscosity

Objective:Determine flow resistance.

Instrument:Viscometer VS-300

Results and Observations

Table 1: Spectrometer and Conductivity Results

|  |  |  |
| --- | --- | --- |
| **Sample** | **Absorbance (nm)** | **Conductivity (uS/cm)** |
| Sample A | 650.5 | 1450 |
| Sample B | Not applicable | 850 |
| Sample F | 900.0 | Not applicable |

Table 2: Centrifuge and Rheometer Data

|  |  |  |
| --- | --- | --- |
| **Sample** | **RPM** | **Viscosity (Pa-s)** |
| Sample C | 1200 | Not applicable |
| Sample D | Not applicable | 100 |
| Sample H | 14500 | 500 |

Table 3: Four Ball and Viscometer Results

|  |  |  |
| --- | --- | --- |
| **Sample** | **Wear Scar (mm)** | **Viscosity (cP)** |
| Sample E | 0.550 | Not applicable |
| Sample G | 0.350 | Not applicable |
| Sample C (Glycerin) | Not applicable | 5138.68 |
| Sample C (Vitamin E) | Not applicable | 5208.45 |

Distractions and Observations

Discussion

The analysis of the oil mixtures revealed significant differences in the physical properties. Notably, the addition of Glycerin or Vitamin E changed the conductivity and viscosity measurements dramatically, as observed in Samples G and C.

Complex Descriptions

The rheological properties, such as those of Sample D, demonstrated notable viscoelastic behavior conducive to high shearing environments. This implies a complex interaction between Jojoba Oil and Beeswax which suggests a non-Newtonian flow property underscored by the substantial resistive force measuring 100 Pa-s.

Sample C presented pronounced viscosity discrepancies when analyzed with Glycerin versus Vitamin E, showcasing a remarkable sensitivity to constituent variations.

Conclusion

This study provided valuable insights into the interactive behavior of oil mixtures. The methodologies employed highlighted the nuanced roles of each component, paving the way for applications in cosmetic formulation and material lubrication. Further research is recommended to explore thermal and long-term stability effects on similar mixtures.

Note: Ensure to cross-reference unautomated data extraction efforts with manual reinterpretation for comprehensive understanding.