Lab Report: Analysis of Various Oil Mixtures

Report ID: Report\_2399

Introduction

The objective of this lab report is to analyze various oil mixtures using different instruments to determine their physical and chemical properties. The instruments employed include a Mass Spectrometer, Four Ball Tester, Centrifuge, PCR Machine, HPLC System, Titrator, pH Meter, and Viscometer.

Materials and Methods

In this experiment, the following mixtures were tested: Coconut Oil with Beeswax and Glycerin, Jojoba Oil with Gum and Vitamin E, and Almond Oil with Gum and Glycerin. Each mixture was analyzed using the specified instruments detailed in the tables below. The specific parameters measured included m/z ratio, wear scar in millimeters, RPM, cycle threshold, concentration, molarity, pH, and viscosity in centipoise (cP).

Table 1: Mass Spectrometry and HPLC Analysis| Instrument | Mixture Components | Measurement Type | Value |  
|------------|-------------------------|------------------|--------|  
| MS-20 | Coconut Oil, Beeswax | m/z | 1500 |  
| HPLC-9000 | Coconut Oil, Beeswax, Glycerin | mg/L | 500 |

Observation: The mass spectrometry analysis revealed a prominent m/z peak at 1500, suggesting a stable molecular ion presence. The HPLC system demonstrated a concentration level of 500 mg/L for the mixture containing glycerin.

Results and Discussion

The investigation into these mixtures has provided insights into their physical properties and how these properties change with different components.

1. Wear and Friction Analysis

Table 2: Four Ball Wear Tests(Irrelevant details omitted for clarity)| Instrument | Mixture Components | Wear Scar (mm) |  
|---------------|-------------------------------|----------------|  
| FB-1000 | Jojoba Oil, Cetyl Alcohol, Vitamin E | 0.450 |

The Four Ball Tester was utilized to evaluate the wear protection capabilities of the mixtures. The combination of Jojoba Oil, Cetyl Alcohol, and Vitamin E exhibited a wear scar diameter of just 0.450 mm, indicating effective lubrication properties.

2. Centrifuge and PCR Analysis

Table 3: Stability and Thermal Resilience| Instrument | Mixture Components | Parameter | Measurement |  
|---------------|-------------------------|-------------|---------------|  
| X100 | Almond Oil, Beeswax | RPM | 12000 |  
| PCR-96 | Almond Oil, Gum | Cycle Count | 30 |

The stability of Almond Oil and Beeswax was confirmed with centrifugation at 12,000 RPM, while the resilience of Almond Oil with Gum was demonstrated with a cycle threshold of 30 in the PCR machine.

3. Titration and pH Variations

Table 4: Chemical Properties| Instrument | Mixture Components | Measurement | Value |  
|-------------------------|--------------------|--------------|-------------|  
| T-905 (Titrator) | Almond Oil | Molarity | 0.500 M |  
| PH-700 (pH Meter) | Coconut Oil, Beeswax, Vitamin E | pH | 8 |

The titration of Almond Oil displayed a molarity of 0.500 M, while a pH of 8 was recorded for the Coconut Oil, Beeswax, and Vitamin E mixture, indicating a mildly alkaline character.

4. Viscosity Analysis

Table 5: Viscosity Measurements| Instrument | Mixture Components | Viscosity (cP) |  
|---------------|-------------------------|----------------|  
| VS-300 | Almond Oil, Gum, Glycerin | 7666.42 |  
| VS-300 | Jojoba Oil, Gum | 1895.54 |

The highly viscous nature of the Almond Oil, Gum, and Glycerin mixture was observed with a viscosity of 7666.42 cP. In comparison, the viscosity of Jojoba Oil with Gum was significantly lower.

Conclusion

The analysis of various oil mixtures through multi-instrument testing provided comprehensive data on their physical and chemical properties. From wear resistance to viscosity and molarity, each mixture's characteristics suggest different potential applications, ranging from lubrication to cosmetics. The scattered observations and unrelated interim conclusions require careful attention to detail for comprehensive understanding, enhancing the complexity of data extraction.

Note: The report includes deliberately intricate formats and mixed data types to test analysis skills comprehensively.