Lab Report: 955 - Analysis of Oil and Additive Mixtures

Introduction

This lab report details the comprehensive analysis of multiple mixtures containing various oils and additives. Each mixture underwent a series of tests utilizing state-of-the-art laboratory instruments. The objective was to evaluate the conductive, centrifugal, thermal, chromatographic, and viscometric properties of each mixture, thereby gaining insights into their functional characteristics.

Materials and Methods

Instruments Utilized

Sample Mixtures Analyzed

Observations

Table 1: Conductivity Testing Results

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Mixture ID** | **Ingredients** | **Device** | **Measurement** | **Unit** |
| M1 | Almond Oil, Beeswax, Glycerin | CM-215 | 1200.0 | uS/cm |
| M1\* | Almond Oil, Cetyl Alcohol, Vitamin E | CM-215 | 1800.0 | uS/cm |
| Sample M1 and M1\* depict distinct variations in conductivity, suggesting a dependency on both oil and additive composition. | nan | nan | nan | nan |

Centrifuge Analysis

Data shows variable RPM outcomes, with Almond Oil blends peaking differently than Coconut Oil configurations. Viscosity and density potentially influenced these disparities, an aspect worth further grinding analysis.

Table 2: Centrifugal Speeds

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Mixture ID** | **Ingredients** | **Instrument** | **Speed** | **Unit** |
| M2 | Almond Oil, Beeswax, Vitamin E | X100 | 8500.0 | RPM |
| M3 | Coconut Oil, Beeswax | X100 | 9500.0 | RPM |
| The above table indicates RPM variances, hypothesizing potential effects of oil viscosity. | nan | nan | nan | nan |

Thermal Cycling

The Thermocycler TC-5000 provided insights into stability under thermal stress, reflected in degrees (Celsius).

Table 3: Thermal Cycling Data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Mixture ID** | **Ingredients** | **Instrument** | **Temperature** | **Unit** |
| M4 | Almond Oil, Gum, Glycerin | TC-5000 | 45.0 | °C |
| M5 | Coconut Oil, Beeswax, Glycerin | TC-5000 | 60.0 | °C |
| Temperature variations elucidate differences in heat tolerance and breakdown thresholds. | nan | nan | nan | nan |

Chromatography and Mass Spectrometry

HPLC and chromatography indicated component separation at remarkable concentrations:

Table 4: Chromatography and Mass Spectrometry

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Mixture ID** | **Ingredients** | **Instrument** | **Value** | **Unit** |
| M6 | Almond Oil, Cetyl Alcohol | HPLC-9000 | 300.0 | mg/L |
| M7 | Coconut Oil, Cetyl Alcohol | LC-400 | 250.0 | μg/mL |
| M8 | Jojoba Oil, Cetyl Alcohol, Glycerin | MS-20 | 1500.0 | m/z |
| Concentration levels afford significant insights into compound purity and presence. | nan | nan | nan | nan |

Results

Table 5: Viscometric Analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Mixture ID** | **Ingredients** | **Instrument** | **Viscosity** | **Unit** |
| M9 | Coconut Oil, Cetyl Alcohol | VS-300 | 5220.45 | cP |
| M10 | Jojoba Oil, Cetyl Alcohol, Glycerin | VS-300 | 2725.98 | cP |
| The viscosity results convey material robustness across different oil bases, indicating functional application utility. | nan | nan | nan | nan |

Conclusion

The exhaustive testing of various oil and additive mixtures provides crucial data on their chemical and physical properties. Conductivity, separation efficiency, thermal response, and viscosity are all evidenced as largely contingent on component makeup. The assessment undertaken through this series of lab tests illustrates the nuanced interplay of ingredients and the resultant effects on performance metrics. Further studies might focus on the elucidation of underlying molecular interactions.