Lab Report: Analysis of Various Oil-Based Mixtures

Introduction

This lab report provides a comprehensive analysis of multiple oil-based mixtures using advanced analytical techniques. The tests were conducted to assess physical and chemical properties of the mixtures, which include components such as Almond Oil, Coconut Oil, and Jojoba Oil, in combination with additives like Beeswax, Gum, and Vitamin E.

Table 1: Equipment Utilized in Testing

|  |  |  |
| --- | --- | --- |
| **Equipment ID** | **Instrument Name** | **Purpose** |
| T-905 | Titrator | Evaluate molarity of mixtures |
| FTIR-8400 | FTIR Spectrometer | Measure absorbance spectrum |
| GC-2010 | Gas Chromatograph | Analyze volatile compound concentrations |
| LC-400 | Liquid Chromatograph | Determine solute concentrations |
| MS-20 | Mass Spectrometer | Identify mass-to-charge ratios |
| R-4500 | Rheometer | Assess viscosity under stress |
| XRD-6000 | X-Ray Diffractometer | Evaluate crystallinity |
| VS-300 | Viscometer | Measure dynamic viscosity |

Note:The setup time for each instrument varied between 30 to 45 minutes.

Observations

The mixtures under different physical states displayed unique characteristics. At room temperature, certain combinations like 'Jojoba Oil, Cetyl Alcohol, Glycerin' were more viscous compared to others. The tests were conducted under controlled environments to ensure precision.

Table 2: Mixture and Measurement Observations

|  |  |  |  |
| --- | --- | --- | --- |
| **Mixture Component Combination** | **Measurement Parameter** | **Observed Value** | **Units** |
| Coconut Oil, Gum, Vitamin E | Molarity | 7.532 | M |
| Almond Oil, Beeswax | Wavenumber | 3500.0 | 1/cm |
| Coconut Oil, Beeswax | Concentration | 500.0 | ppm |
| Jojoba Oil, Cetyl Alcohol, Glycerin | Mass-to-Charge Ratio | 1200.0 | m/z |
| Coconut Oil, Cetyl Alcohol, Glycerin | Viscosity | 750.0 | Pa-s |

Unproductive data was inadvertently collected during initial trials with traces of condensation affecting some equipment like the XRD-6000.

Measurements & Results

The series of tests conducted reveal specific attributes about the chemical and physical nature of the mixtures. The data was collected from precise instrumentation, ensuring high fidelity results.

Table 3: Chemical Properties of Mixtures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Mixture** | **Equipment** | **Property** | **Measure** | **Unit** |
| Coconut Oil, Gum, Vitamin E | Titrator T-905 | Molarity | 7.532 | M |
| Jojoba Oil, Cetyl Alcohol | Titrator T-905 | Molarity | 0.005 | M |
| Almond Oil, Beeswax | FTIR FTIR-8400 | Wavenumber | 3500.0 | 1/cm |
| Coconut Oil, Gum, Vitamin E | FTIR FTIR-8400 | Wavenumber | 1850.0 | 1/cm |
| Coconut Oil, Beeswax | GC-2010 | Concentration | 500.0 | ppm |

Each mixture comprises a unique chemical fingerprint distinguishable by wavenumber and mass-to-charge ratios. The mass spectrometric analysis presented notable peaks that depicted molecular stability as shown in Table 3.

Table 4: Rheological and Thermal Properties

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Mixture Component Combination** | **Equipment** | **Property** | **Observed Value** | **Units** |
| Coconut Oil, Cetyl Alcohol, Glycerin | Rheometer R-4500 | Viscosity | 750.0 | Pa-s |
| Jojoba Oil, Beeswax, Glycerin | Viscometer VS-300 | Viscosity | 2734.63 | cP |
| Almond Oil, Gum, Glycerin | Viscometer VS-300 | Viscosity | 7642.11 | cP |
| Almond Oil, Gum, Vitamin E | Viscometer VS-300 | Viscosity | 7593.52 | cP |
| Coconut Oil, Cetyl Alcohol, Glycerin | XRD-6000 | Temperature | 130.0 | C |

Various apparatuses were required to determine the rheological properties accurately. Note that multiple readings showed notable shifts in viscosity with minor temperature variations, often leading to insignificant yet noteworthy measurement errors.

Conclusion

The analysis of these oil-based mixtures using advanced techniques provided insight into their chemical and physical characteristics. Varying conditions, such as temperature and pressure, impacted results significantly. These findings could facilitate the development of cosmetic or pharmaceutical applications.

Irrelevant Note:During testing, a stray banana peel was found near the working bench, posing unexpected yet humorous risk of slipping accidents.

This report comprises consolidated yet indirectly connected data points valuable for advancing experimental laboratory methodologies in organic mixtures.