Lab Report 615

Introduction

This comprehensive lab report details the evaluation of various mixtures using advanced analytical instruments. Each set of ingredients was treated as a single test sample. The analysis involved measuring different properties such as rotational speed, wavelength, absorption, conductivity, concentration, and viscosity, among others.

Methodology

The samples were prepared by combining ingredients as specified, and several tests were conducted using a range of analytical instruments. The following is a summary of the methods applied:

Centrifugationwas employed using the Centrifuge X100 to analyze the sedimentation rate of Almond Oil mixed with Gum.

Spectral Analysiswith the Spectrometer Alpha-300 focused on examining Coconut Oil, Gum, and Vitamin E.

UV-Vis Spectrophotometrywas conducted to understand the interaction of Coconut Oil, Beeswax, and Glycerin.

Conductivity Measurementaimed to determine the conductive properties of Coconut Oil mixed with Beeswax.

Liquid Chromatographyon Jojoba Oil, Cetyl Alcohol, and Vitamin E identified specific molecular components.

Gas Chromatographyprovided details on the volatility of Almond Oil and Vitamin E.

Thermal Cyclinganalyzed the stability of Coconut Oil.

Mass Spectrometryevaluated the molecular weight distribution of Jojoba Oil, Cetyl Alcohol, and Glycerin.

X-Ray Diffractionoffered insights into the crystalline structure of Almond Oil and Gum.

FTIR Spectroscopyidentified functional groups in the Coconut Oil, Beeswax, and Glycerin mixture.

Viscosity Measurementsof various Coconut Oil mixtures showcased their flow properties.

Observations and Results

Table 1: Centrifugation & Spectral Analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Instrument** | **Ingredients** | **Property** | **Value** | **Unit** |
| Centrifuge X100 | Almond Oil, Gum | Speed | 12345 | RPM |
| Spectrometer Alpha-300 | Coconut Oil, Gum, Vit E | Wavelength | 250 | nm |

Observations indicated a rapid sedimentation for Almond Oil mixtures at high RPMs. The spectral analysis at 250 nm highlighted a strong interaction between the components.

Table 2: Spectrophotometry, Conductivity & Chromatography

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Instrument** | **Ingredients** | **Property** | **Value** | **Unit** |
| UV-Vis Spectrophotometer UV-2600 | Coconut Oil, Beeswax, Glycerin | Absorption | 2.1 | Abs |
| Conductivity Meter CM-215 | Coconut Oil, Beeswax | Conductivity | 1800.0 | uS/cm |
| Liquid Chromatograph LC-400 | Jojoba Oil, Cetyl Alc, Vit E | Concentration | 12.5 | ug/mL |

The absorption spectrum showed notable peaks suggesting complex formations in the UV-Vis spectrophotometry results. The conductivity measurement was relatively elevated due to the inclusion of Beeswax indicating ionic presence.

Table 3: Gas Chromatography, Mass Spectrometry & X-Ray Diffraction

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Instrument** | **Ingredients** | **Property** | **Value** | **Unit** |
| Gas Chromatograph GC-2010 | Almond Oil, Vitamin E | Volatility | 500 | ppm |
| Mass Spectrometer MS-20 | Jojoba Oil, Cetyl Alc, Glycerin | Mass/Charge | 1500 | m/z |
| X-Ray Diffractometer XRD-6000 | Almond Oil, Gum | Temperature | 30 | C |

The gas chromatograph depicted significant volatility at 500 ppm. The mass spectrometry results aligned with expected m/z ratios for the complex mixture analyzed.

Table 4: Thermal, FTIR & Viscosity Analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Instrument** | **Ingredients** | **Property** | **Value** | **Unit** |
| Thermocycler TC-5000 | Coconut Oil | Temp Stability | 65.0 | C |
| FTIR Spectrometer FTIR-8400 | Coconut Oil, Beeswax, Glycerin | Wavenumber | 3500.0 | 1/cm |
| Viscometer VS-300 | Coconut Oil, Gum | Viscosity | 5192.11 | cP |
| nan | Coconut Oil, Vitamin E | Viscosity | 4979.81 | cP |
| nan | Coconut Oil, Gum, Vitamin E | Viscosity | 5272.27 | cP |

Thermal cycling at 65°C emphasized the firmness of Coconut Oil. FTIR spectra revealed absorption bands typical of the functional groups present. Viscosity assessments displayed a range from 4979.81 to 5272.27 cP, indicating variations due to compositional differences.

Conclusion

This detailed investigation offers a comprehensive assessment of multiple mixtures analyzed through sophisticated instruments. Each measurement provides critical insights into the physical and chemical interactions occurring within these complex systems. Further research might explore the dynamic stability or reactivity under varying environmental conditions.

End of Report.