Laboratory Report

Report Number: 1299

Experiment: Analysis of Various Oil Mixtures

Introduction

The purpose of this experiment was to analyze a series of oil mixtures using different chemical and physical properties measurement techniques. Each mixture contained a unique combination of oils and additional compounds, subjected to various scientific analyses to determine their characteristics. The methodologies employed covered a broad spectrum of laboratory instruments, ensuring comprehensive profiling of each mixture.

Methods and Materials

For this study, the mixtures included combinations such as Jojoba Oil with Beeswax, Coconut Oil with Glycerin, and others, prepared under controlled laboratory conditions. The primary instruments utilized were:

Observations and Measurements

Table 1: Conductivity Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Mixture** | **Instrument** | **Measurement** | **Unit** |
| Jojoba Oil, Gum, Glycerin | Conductivity Meter CM-215 | 998 | uS/cm |
| Coconut Oil, Gum, Vitamin E | Conductivity Meter CM-215 | 1500 | uS/cm |

Irrelevant Note: The laboratory was unusually warm on the day of measurement, which may have influenced the relaxation time of the molecular motion observed.

Table 2: Chemical Composition via Gas Chromatography

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample Mixture** | **Instrument** | **Compound** | **Concentration** | **Unit** |
| Jojoba Oil, Cetyl Alcohol | Gas Chromatograph GC-2010 | Cetyl Alcohol | 500 | ppm |
| Jojoba Oil, Beeswax | NMR Spectrometer NMR-500 | Beeswax | 15 | ppm |

Internal Observation: The baselines of chromatographs seemed unusually wavy, yet within acceptable limits.

Table 3: Physical Properties Measurements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample Mixture** | **Instrument** | **Property** | **Value** | **Unit** |
| Coconut Oil, Glycerin | Four Ball Tester FB-1000 | Wear Scar Diameter | 0.75 | mm |
| Almond Oil, Gum, Glycerin | HPLC System HPLC-9000 | Glycerin | 250.0 | mg/L |
| Almond Oil, Cetyl Alcohol, Vitamin E | Viscometer VS-300 | Viscosity | 7353.07 | cP |

Footnote: Viscosity measures could be affected by oil temperature. The viscosity of one sample was recorded twice due to anomalous initial readings.

Table 4: Temperature and Optical Density Measurements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample Mixture** | **Instrument** | **Condition** | **Measurement** | **Unit** |
| Almond Oil, Beeswax, Vitamin E | Thermocycler TC-5000 | Temperature | 72.0 | C |
| Coconut Oil | Microplate Reader MRX | Optical Density | 2.5 | OD |

Additional Information: The optical density was taken at a wavelength of 600 nm, a common reference for yeast growth analysis, though unrelated to this study.

Results and Discussion

The analyses of the mixtures provided insight into their conductivity, chemical composition, wear resistance, and viscosity. Notably, the viscosity of almond oil-cetyl alcohol was significantly higher, likely due to molecular interactions between the constituents. Conductivity varied broadly across samples, indicating differences in ionic concentrations.

The complexity of GC-MS data indicated underlying complexities in ester bond formations, noteworthy for developing cosmetic formulations.

The wear scar measurements (Four Ball Tester) revealed that Coconut Oil mixtures exhibited moderate mechanical resilience, significant for applications involving surface protection.

Conclusion

The study successfully characterized multiple oil mixtures, revealing distinct physical and chemical profiles. This information aids in selecting appropriate formulations for specific industrial applications. Further research might delve into temperature influence on viscosity and conductivity for refined understanding.

Observationally, careful attention should be paid to maintaining stable laboratory conditions, as external factors such as ambient temperature could subtly influence readings, particularly in temperature-sensitive assays.

Random Observation: A stray cat was found in the lab area but posed no disturbance to the experiments conducted.

References

The report contains critical measurement data computed through various sophisticated techniques, targeting profound insights for the application of oils in practical settings. Further intricacies of the data can only be appreciated within the context of experimental conditions and nuances in the laboratory environment.