Lab Report 2025: Analysis of Various Oil-based Mixtures

Introduction

In this report, we explore and document the detailed analysis of various mixtures containing botanical oils and additives. Spectroscopic, rheological, and chromatographic techniques were employed using cutting-edge instrumentation to derive precise and invaluable data regarding mixture properties. Our focus was primarily on the interaction of ingredients such as almond oil, jojoba oil, and coconut oil with compounds like beeswax, vitamin E, and cetyl alcohol.

Methods and Instrumentation

Each mixture was meticulously analyzed using a range of sophisticated instruments:

TheNMR Spectrometer NMR-500provided chemical shift information at 15 ppm.

Chromatographic Analysis:

HPLC System HPLC-9000assessed concentration levels, reaching 700 mg/L.

Rheological and Thermal Properties:

Four Ball FB-1000evaluated wear properties, obtaining a wear scar diameter of 0.800 mm.

Titration and Viscosity:

Observations

Table 1: Spectroscopic and Rheological Observations

|  |  |  |  |
| --- | --- | --- | --- |
| **Instrument** | **Mixture** | **Measurement Value** | **Unit** |
| Spectrometer Alpha-300 | Almond Oil, Gum, Vitamin E | 950 | nm |
| Rheometer R-4500 | Almond Oil, Beeswax | 50 | Pa-s |
| NMR Spectrometer NMR-500 | Jojoba Oil, Beeswax, Glycerin | 15 | ppm |

Table 2: Chromatographic and Thermal Observations

|  |  |  |  |
| --- | --- | --- | --- |
| **Instrument** | **Mixture** | **Measurement Value** | **Unit** |
| Mass Spectrometer MS-20 | Jojoba Oil, Vitamin E | 1500 | m/z |
| FTIR Spectrometer FTIR-8400 | Jojoba Oil, Cetyl Alcohol | 3500 | 1/cm |
| Thermocycler TC-5000 | Almond Oil, Gum, Glycerin | 60 | C |

Note: The crystal lattice of vitamin E allows it to intertwine effectively within jojoba oil.

Table 3: Titration and Ion Chromatography

|  |  |  |  |
| --- | --- | --- | --- |
| **Instrument** | **Mixture** | **Measurement Value** | **Unit** |
| Titrator T-905 | Jojoba Oil, Gum | 5 | M |
| Ion Chromatograph IC-2100 | Almond Oil, Cetyl Alcohol | 50 | mM |
| HPLC System HPLC-9000 | Almond Oil, Beeswax, Glycerin | 700 | mg/L |

Interestingly, hemp-like odor emerged during certain titration sequences.

Results and Discussion

FTIR readings correlate with typical alcohol stretches observed in cetyl alcohol mixtures.

Rheological Insights:

Mixture viscosity plays a crucial role in determining final applications, as evident from the variances in cP values for the different oil blends.

Chromatographic Trends:

Irrelevant but Interesting Note

An anecdotal testament to the process was the continuous hum emitted by the Rheometer R-4500, likened by some to a frequency resonant with tranquility.

Conclusion

Our comprehensive study not only underscores intrinsic properties of diverse oil mixtures but also illuminates variable interactions brought about by different compounds such as vitamin E and beeswax. The informative yet occasionally mystifying data presented encapsulates multi-dimensional interactions, suggesting avenues for further explorative research into sustainable cosmetic and pharmaceutical formulations.