Laboratory Report: Analysis of Various Mixtures

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Introduction

This report presents comprehensive analysis results for a selection of experimental mixtures composed of various oils, alcohols, gums, and vitamins. Our research emphasizes discerning the physical and chemical properties of these mixtures using state-of-the-art equipment. We aim to provide insights into the behavior and compatibility of different components within each mixture.

Experimental Setup and Methods

Instruments and Equipment Utilized:

Samples Tested

Each set of ingredients (e.g., "Coconut Oil, Gum, Vitamin E") was treated as a single test sample:

Tables of Measurements

Table 1: Conductivity and Mass Measurements

|  |  |  |  |
| --- | --- | --- | --- |
| **Equipment** | **Sample Composition** | **Measurement** | **Unit** |
| Conductivity Meter CM-215 | Coconut Oil, Gum, Vitamin E | 1250 | uS/cm |
| Mass Spectrometer MS-20 | Coconut Oil, Cetyl Alcohol, Vitamin E | 1200 | m/z |

Table 2: Spectral and Absorption Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Equipment** | **Sample Composition** | **Measurement** | **Unit** |
| Spectrometer Alpha-300 | Jojoba Oil, Cetyl Alcohol, Glycerin | 750.0 | nm |
| UV-Vis Spectrophotometer UV-2600 | Jojoba Oil, Gum, Vitamin E | 2.1 | Abs |

Miscellaneous Measurements

Table 3: Additional Observed Parameters

|  |  |  |  |
| --- | --- | --- | --- |
| **Equipment** | **Sample Composition** | **Measurement** | **Unit** |
| FTIR Spectrometer FTIR-8400 | Jojoba Oil, Gum, Vitamin E | 1600.0 | 1/cm |
| Four Ball FB-1000 | Jojoba Oil | 0.5 | mm |
| NMR Spectrometer NMR-500 | Coconut Oil, Gum, Vitamin E | 15.0 | ppm |
| Gas Chromatograph GC-2010 | Coconut Oil, Cetyl Alcohol, Vitamin E | 250.0 | ppm |
| PCR Machine PCR-96 | Jojoba Oil, Cetyl Alcohol, Glycerin | 20.0 | Ct |
| Titrator T-905 | Jojoba Oil | 0.009 | M |

Results and Discussion

The conducted experiments provided insightful data regarding the properties of each test sample. Significant observations were noted using advanced analytical techniques, which elucidated the interactions between components at both molecular and macroscopic levels.

Conductivity and Mass Analysis:The conductivity of the Coconut Oil, Gum, Vitamin E mixture was measured at 1250 uS/cm, indicating moderate ion mobility in this organic medium. The mass spectrometry results reflected a m/z value of 1200 for Coconut Oil, Cetyl Alcohol, Vitamin E, suggesting substantial molecular mass compatibility.

Spectral Observations:- The Spectrometer Alpha-300 highlighted a peak at 750 nm for the Jojoba Oil, Cetyl Alcohol, Glycerin mixture, indicating potential absorption or emission of interest.  
- The UV-Vis Spectrophotometer showcased an absorbance of 2.1 at specific wavelengths for the Jojoba Oil, Gum, Vitamin E composition, illustrating notable light-absorbing property readiness.

NMR and FTIR Observations:- The NMR analysis confirmed a chemical shift at 15 ppm, particularly for Coconut Oil, Gum, Vitamin E, suggesting particular resonance adjustments due to ingredient interactions.  
- The FTIR analysis provided key spectral information with significant peaks at 1600 1/cm, demonstrating critical vibrational modes in the mixture of Jojoba Oil, Gum, Vitamin E.

Mechanical and Chemical Properties:- The ball wear measurement of 0.500 mm conducted using the Four Ball FB-1000 revealed mechanical resilience for pure Jojoba Oil.  
- The titration indicated a molarity of 0.009 M, contributing information on the Jojoba Oil’s acid-base neutralization capacity.

Additional Insights and Random Observations

Interspersed within this study are incidental findings such as the compatibility thresholds and stability ranges of the mixtures. These additional insights may seem peripheral but are invaluable for material science applications.

Conclusion

The systematic exploration of these mixtures' varied properties demonstrates their potential application within cosmetic and chemical industries. However, nuances in spectral and mechanical properties require further investigation to fully understand these materials' behavioral dynamics.

Overall, the detailed compositional analysis has provided a foundational understanding to enable future research endeavors and potential commercial exploitation. Further studies will focus on expanding the mixture matrices and refining analytical precision.