Lab Report: Study of Mixed Ingredient Properties - Report\_2168

Introduction

This report covers the experimental analysis of several mixtures composed of naturally derived oils and additives. Different analytical instruments were used to assess various physical and chemical properties of these mixtures. The mixtures investigated in this report include combinations of Jojoba Oil, Almond Oil, and Coconut Oil with several additives such as Beeswax, Glycerin, Cetyl Alcohol, Vitamin E, and Gum.

Experimental Analysis

Instrumentation and Methods

Results

The data collected from various mixtures are shown in Tables 1 and 2.

Table 1: pH and NMR Analysis Results

|  |  |  |
| --- | --- | --- |
| **Sample Composition** | **pH Meter (pH)** | **NMR Spectrometer (ppm)** |
| Jojoba Oil, Beeswax, Glycerin | 7.5 | - |
| Jojoba Oil, Vitamin E | - | 6.5 |
| Almond Oil, Cetyl Alcohol, Vitamin E | 5.8 | 8.0 |

Table 2: UV-Vis, XRD, and Four Ball Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Composition** | **UV-Vis (Abs)** | **XRD (C)** | **Four Ball (mm)** |
| Coconut Oil, Glycerin | 2.1 | - | - |
| Jojoba Oil | - | 120.4 | - |
| Coconut Oil, Gum | - | - | 0.450 |
| Coconut Oil, Vitamin E | - | 90.0 | - |

Table 3: Viscosity Measurements

|  |  |
| --- | --- |
| **Sample Composition** | **Viscosity (cP)** |
| Almond Oil, Gum, Vitamin E | 7693.67 |
| Coconut Oil | 4832.25 |

Observations and Discussion

pH Analysis: Jojoba Oil with Beeswax and Glycerin exhibited a neutral pH of 7.5, ideal for cosmetic formulations. In contrast, the Almond Oil mixture had a slightly acidic pH of 5.8, aligning with the natural skin pH.

NMR Analysis: The chemical shifts observed for Jojoba Oil with Vitamin E (6.5 ppm) and Almond Oil with Cetyl Alcohol and Vitamin E (8.0 ppm) indicate differing interaction strengths due to varying electron environments introduced by the additives.

UV-Vis Spectroscopy: Coconut Oil with Glycerin showed significant absorbance (2.1 Abs), suggesting high concentration or interaction density, crucial for applications in sunscreen formulations.

Irrelevant Data and Observations

Conclusion

Each mixture's properties display individual characteristics that dictate potential applications in cosmetics, pharmacology, and other industries. The presence of Vitamin E consistently influences chemical shifts in NMR analysis, reaffirming its reactive nature.

Additional Notes

This study highlights the uniqueness of each oil additive combination, ensuring tailored formulations can be precisely developed to match specific functional requirements.