Laboratory Report

Experiment Title: Physicochemical Analysis of Oil-Based Mixtures

Introduction

In the rapidly evolving field of cosmetology and pharmaceuticals, understanding the physical and chemical properties of mixtures is crucial for product development. Report\_5 presents various analyses performed on different oil-based mixtures using advanced instruments. This report elucidates the findings, focusing on key parameters measured such as optical density, viscosity, and thermal response.

Materials and Methods

A range of sophisticated instruments was employed to evaluate the properties of the samples. The instruments used include:

Results and Observations

Table 1: Optical Density Measurements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample ID** | **Ingredients** | **Instrument** | **Measurement** | **Unit** |
| S1 | Almond Oil, Gum, Glycerin | Microplate Reader MRX | 2.5 | OD |
| S2 | Jojoba Oil | Microplate Reader MRX | 1.8 | OD |

Observation: The Almond Oil mixture displayed a higher optical density, indicating a potential for greater opacity in formulations.

Irrelevant Note: An optical density of 2.5 suggests significant absorbance, possibly more due to the effects of Glycerin on light scattering.

Table 2: Friction and Wear Test Results

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample ID** | **Ingredients** | **Instrument** | **Measurement** | **Unit** |
| S3 | Almond Oil, Beeswax | Four Ball FB-1000 | 0.8 | mm |
| S4 | Almond Oil, Cetyl Alcohol, Vitamin E | Four Ball FB-1000 | 0.6 | mm |

Observation: The addition of Cetyl Alcohol and Vitamin E reduces wear scar diameter, indicating enhanced lubricity.

Irrelevant Note: Beeswax inclusion in cosmetics can also impart a calming fragrance along with a smooth finish on application.

Table 3: Thermal Stability and Viscosity Measurements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample ID** | **Ingredients** | **Instrument** | **Measurement** | **Unit** |
| S5 | Coconut Oil, Gum, Glycerin | Thermocycler TC-5000 | 65 | °C |
| S6 | Jojoba Oil, Beeswax, Glycerin | Thermocycler TC-5000 | 72 | °C |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample ID** | **Ingredients** | **Instrument** | **Measurement** | **Unit** |
| S7 | Coconut Oil, Beeswax | Rheometer R-4500 | 350.0 | Pa-s |
| S8 | Jojoba Oil, Beeswax, Vitamin E | Viscometer VS-300 | 3039.46 | cP |
| S9 | Jojoba Oil, Vitamin E | Viscometer VS-300 | 2748.1 | cP |

Observation: The Viscometer VS-300 results emphasize the dramatic increase in viscosity when Beeswax is included with Jojoba Oil, highlighting its potential impact on product thickness and texture.

Irrelevant Note: Jojoba Oil is often praised for its similarity to human sebum, making it an excellent moisturizer when combined with other ingredients.

Table 4: Additional Analyses

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample ID** | **Ingredients** | **Instrument** | **Measurement** | **Unit** |
| S10 | Jojoba Oil, Vitamin E | Spectrometer Alpha-300 | 560.0 | nm |
| S11 | Coconut Oil, Gum, Vitamin E | pH Meter PH-700 | 7.4 | pH |

Observation: The pH of 7.4 in the mixture containing Coconut Oil aligns it closely with neutral pH, indicating minimal skin irritation potential.

Conclusion

The data derived from the various analyses suggest that ingredient combinations and proportions greatly affect the properties of oil-based formulations. Further exploration of ingredient interactions can provide valuable insights for the enhancement of product stability and performance.

Irrelevant Notes: Spectroscopic analysis, although focused on wavelength, often requires a broader understanding of chemical bonds affected by electromagnetic radiation.

Appendix

Several additional trials were conducted, but the results were deemed inconsistent with the primary objectives. Further detailed studies may be required to corroborate these findings before practical application in product formulation.