Lab Report 987: Analysis of Cosmetic Formulations

Introduction

The primary objective of this experiment was to assess the rheological, optical, chromatographic, and spectral properties of various cosmetic formulations using advanced analytical instruments. Each formulation, consisting of specific mixtures of oils, waxes, and additives, was subjected to a series of tests. The goal was to understand how these components interact to inform future cosmetic chemistry applications. Below, we present our findings in detail.

Instruments and Methodologies Utilized

Observations and Results

Table 1: Rheological and Optical Analysis

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| --- | --- | --- | --- |
| **Instrument** | **Sample Composition** | **Measurement** | **Value (Unit)** |
| Rheometer R-4500 | Almond Oil, Gum | Viscosity | 582.4 (Pa-s) |
| Rheometer R-4500 | Almond Oil, Cetyl Alcohol, Glycerin | Viscosity | 450.1 (Pa-s) |
| Microplate Reader MRX | Almond Oil, Vitamin E | OD | 1.2 (OD) |
| Microplate Reader MRX | Coconut Oil, Beeswax | OD | 3.5 (OD) |

Irrelevant Information: During the viscosity testing of samples in a sealed environment, a control sample left open showed unexpected carbonation, hinting at possible experimental variations.

Table 2: Chromatographic and Spectral Evaluation

|  |  |  |  |
| --- | --- | --- | --- |
| **Instrument** | **Sample Composition** | **Parameter** | **Value (Unit)** |
| NMR Spectrometer NMR-500 | Jojoba Oil, Gum | Chemical Shift | 7.5 (ppm) |
| NMR Spectrometer NMR-500 | Jojoba Oil, Beeswax, Glycerin | Chemical Shift | 16.2 (ppm) |
| Liquid Chromatograph LC-400 | Almond Oil, Beeswax, Vitamin E | Concentration | 120.3 (ug/mL) |

Irrelevant Information: Note that the adherence to speaking softly in the lab area reportedly increased focus, though unrelated, it improved analytical precision.

Table 3: DNA Quantification and Titration Results

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| --- | --- | --- | --- |
| **Instrument** | **Sample Composition** | **Measure** | **Value (Unit)** |
| PCR Machine PCR-96 | Jojoba Oil, Beeswax, Vitamin E | Ct | 18 |
| PCR Machine PCR-96 | Almond Oil, Glycerin | Ct | 25 |
| Titrator T-905 | Jojoba Oil, Cetyl Alcohol, Vitamin E | Molarity | 0.69 (M) |

Detailed Descriptions

Rheological Analysis

The viscosity ofAlmond Oil, Gummeasured on the Rheometer R-4500 was remarkably higher at 582.4 Pa-s, indicating significant structural interplay. Conversely, an altered formulation withCetyl Alcohol and Glycerinrecorded a reduced viscosity (450.1 Pa-s), demonstrating moderate flow, likely conducive for smoother product application. Remarkably, ambient temperature swings (irrelevant) did not manifest potential anomalies in recorded figures.

Optical and Spectral Analysis

When evaluated using the Microplate Reader MRX,Almond Oil, Vitamin Eexhibited an optical density of 1.2 OD, whileCoconut Oil, Beeswaxachieved a higher absorption value, 3.5 OD. Such variances may suggest different opacity levels, impacting product transparency.

NMR checks revealed influential chemical shifts of 7.5 ppm forJojoba Oil, Gum, and 16.2 ppm for a mixture containingBeeswax and Glycerin, confirming substantial molecular interactions verified under the NMR-500 scanner.

Molecular and Titration Assays

PCR-96 assessed cycle threshold values highlighted vast differences:Jojoba Oil, Beeswaxdisplayed Ct 18, unlikeAlmond Oil, Glycerin, which lingered at a Ct of 25. It reflects variegations in genetic target presence. Additionally, precision titration with the Titrator T-905 yielded a quantified molarity of 0.69 M for theJojoba Oil, Cetyl Alcohol, Vitamin Econcoction—spotlighting chemically expansive potential.

Conclusion

The experimental observations underscore distinct yet measurable properties innate to each specific formulation. These characteristics indicate promising implications for the design of diverse cosmetic products. However, further investigations are warranted to minimize discrepancies noted possibly from ordinary atmospheric disturbances. The above conditions illuminate foundational methodologies pivotal for future advancements in cosmetic formulations and operational industry standards.