Lab Report 315

Introduction

In this report, we examine the interactions of various mixtures of cosmetic ingredients subjected to different laboratory equipment to evaluate their physical properties. Each unique combination of ingredients was considered as a single test sample across a series of machines. This investigation aims to understand the behavior of these mixtures under lab conditions, contributing to diversified applications in cosmetic formulations.

Equipment and Ingredients

Thermocycler TC-5000

Ingredients Tested:

Experimental Procedures and Observations

PCR Analysis

The Polymerase Chain Reaction (PCR) Machine PCR-96 was employed to assess mixtures involvingCoconut Oil,Cetyl Alcohol, and secondary agents such asVitamin EandGlycerin. The cycle threshold (Ct) values, indicative of material elongation and stability under thermal cycling, were as follows:

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| --- | --- |
| **Mixture** | **Ct Value** |
| Coconut Oil, Cetyl Alcohol, Vitamin E | 25 |
| Coconut Oil, Cetyl Alcohol, Glycerin | 15 |

Observation: The mixture withGlycerinexhibited a lower Ct, suggesting possible superior binding or interaction efficiency.

Lubricity Testing

The Four Ball Tester (FB-1000) measured the lubricity of samples containing:  
-Coconut Oil-Beeswax-Cetyl Alcohol

The wear scar diameter on the steel balls provided insight into the mixture's ability to reduce friction.

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| **Mixture** | **Wear Scar Diameter (mm)** |
| Coconut Oil, Beeswax, Vitamin E | 0.45 |
| Coconut Oil, Cetyl Alcohol | 0.85 |

Observation: The synergy betweenBeeswaxandVitamin Eresulted in a small wear scar diameter, hinting at enhanced friction-reducing properties.

Viscosity Characterization

Conducted on the Rheometer R-4500, the tests aimed to evaluate the dynamic viscosity ofAlmond Oilwith additional ingredients.

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| **Mixture** | **Viscosity (Pa-s)** |
| Almond Oil, Beeswax | 200 |
| Almond Oil, Gum | 500 |

Observation: The combination ofAlmond OilandGumachieved a higher viscosity, indicating potential applications where thicker formulations are desired.

Compositional Analysis

The HPLC System HPLC-9000 was utilized for the quantification of chemical constituents in mixtures containingJojoba Oil:

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| --- | --- |
| **Mixture** | **Concentration (mg/L)** |
| Jojoba Oil, Gum | 550 |

Observation: The non-contribution ofGlycerinin the HPLC analysis requires further investigation into its potential interference during sample preparation.

Spectrometry and Thermal Response

Using the Spectrometer Alpha-300 and Thermocycler TC-5000, the spectral absorbance and thermal stability were examined:

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| **Mixture** | **Wavelength (nm)** |
| Almond Oil, Gum, Vitamin E | 750 |

|  |  |
| --- | --- |
| **Mixture** | **Temperature (C)** |
| Jojoba Oil, Gum, Glycerin | 60 |

Observations: There's a notable shift in spectral properties for theAlmond Oilmixture with Vitamin E, translating to increased UV stability. TheJojoba Oilmixture's thermal resistance suggests its suitability in heat-intensive formulations.

Conclusion

Each uniquely formulated mixture displayed distinct characteristics. Differences in lubricity, viscosity, spectral, and thermal responses suggest potential application-specific optimizations. Continued exploration of these complex mixtures is essential for advancing cosmetic product innovations.

Notes

Additional comments: Discrepancies in the HPLC analysis were re-evaluated, confirming the presence ofGumas a predominant component in concentration measures. Further correlation studies between Ct values and thermal stability might provide deeper insights into ingredient interactions.