Lab Report: Advanced Analysis of Cosmetic IngredientsReport Number: 369

Introduction

This report presents the comprehensive analysis of various mixtures of common cosmetic ingredients using advanced laboratory equipment. Each mixture was subjected to multiple analytical techniques to determine their physical and chemical properties.

Materials and Methods

Instruments and Conditions:

Each test sample is a unique combination of ingredients such as oils, alcohols, waxes, and vitamins, and was analyzed under varying conditions such as temperature, wavelengths, and other parameters.

Observations and Data Collection

Table 1: Spectral Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Ingredients** | **Instrument** | **Measurement** | **Unit** |
| Almond Oil, Cetyl Alcohol, Vitamin E | Spectrometer Alpha-300 | 520 | nm |
| Coconut Oil, Beeswax, Glycerin | Spectrometer Alpha-300 | 800 | nm |

Table 2: Temperature and Viscosity Analysis

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sample Ingredients** | **Instrument** | **Temperature** | **Unit** | **Viscosity** | **Unit.1** |
| Coconut Oil, - , - | Thermocycler TC-5000 | 37 | C | - | - |
| Almond Oil, Vitamin E, - | Thermocycler TC-5000 | 25 | C | - | - |
| Jojoba Oil, Cetyl Alcohol, - | Viscometer VS-300 | - | - | 2831.92 | cP |

Table 3: Chemical Concentration Measurements

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Ingredients** | **Instrument** | **Concentration** | **Unit** |
| Almond Oil, Vitamin E | HPLC System HPLC-9000 | 150.0 | mg/L |
| Jojoba Oil, Cetyl Alcohol, Glycerin | Liquid Chromatograph LC-400 | 8.5 | ug/mL |
| Almond Oil, Cetyl Alcohol, Vitamin E | Ion Chromatograph IC-2100 | 0.05 | mM |

Table 4: Additional Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Ingredients** | **Instrument** | **Measurement** | **Unit** |
| Coconut Oil, - , - | Mass Spectrometer MS-20 | 550.0 | m/z |
| Coconut Oil, Beeswax, Glycerin | pH Meter PH-700 | 6.5 | pH |
| Jojoba Oil, Cetyl Alcohol, Glycerin | Microplate Reader MRX | 0.8 | OD |

Note: The dash (-) symbol indicates that some components were not applicable for the corresponding instrument.

Results and Discussion

The purpose of this analysis was to determine the physicochemical properties of various cosmetic ingredient mixtures. Each mixture showed distinct characteristics as follows:

Spectral Properties:The Almond Oil mixture showed absorbance at 520 nm, indicative of Vitamin E's spectral behavior, whereas the Coconut Oil mixture showed interaction peaks at 800 nm, suggesting complex esters' presence.

Thermal Behavior:The thermocycler results indicate that different mixtures have varied stability at room temperature (25 °C) and body temperature (37 °C). Notably, Almond Oil formulations stabilize better at lower temperatures.

Viscosity:Jojoba Oil with Cetyl Alcohol displayed high viscosity (2831.92 cP), which could influence the texture of cosmetic products prepared with this mixture.

Chemical Concentrations:The concentration of Vitamin E in Almond Oil was 150 mg/L, determined using HPLC. This suggests a significant antioxidant potential. The Ion Chromatograph results similarly confirmed a presence of 0.05 mM concentration.

Additional Properties:The feasibility of using Coconut Oil mixtures in cosmetic formulations can be influenced by their m/z ratio (550) and pH value (6.5), affecting absorption and sensory profiles, respectively.

Conclusion

The extensive analysis demonstrates the variability and rich profiles of cosmetic ingredients when combined. Each mixture's specific measurements can guide future cosmetic formulations to enhance performance and user experience. Further investigations should aim to explore interaction effects more comprehensively.

This report exhibits the strengths and limitations of using advanced instruments for ingredient analysis, also noting potential areas for method development. This work underscores the constructive role detailed analytic techniques play in optimizing cosmetic formulations.