Laboratory Report: Analysis of Various Oil-Based Mixtures

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## Introduction

The purpose of this experiment was to analyze various oil-based mixtures using a suite of analytical instruments. Each mixture contained different combinations of oils and additives such asBeeswax,Cetyl Alcohol, andVitamin E. These mixtures were evaluated for their physical and chemical properties to understand their behavior and characteristics in various conditions and analytical scenarios.

## Materials and Methods

Mixtures were prepared with diverse combinations based on common cosmetic formulations. The following devices were employed for analysis:

Mixtures evaluated were:

## Procedures

Each mixture underwent a series of tests to measure properties such as:

## Results

Table 1: Abrasion and Thermocycler Results

| Mixture | Four Ball Tester (Wear Scar in mm) | Thermocycler (Temperature in °C) |
|---|---|---|
| Almond Oil, Beeswax | 0.65 | nan |
| Jojoba Oil | 0.3 | nan |
| Jojoba Oil, Beeswax, Vitamin E | nan | 72.0 |
| Almond Oil, Gum | nan | 45.0 |

Table 2: Spectrophotometric Analysis

| Mixture | UV-Vis Absorbance (Abs) | Spectrometer Peak (nm) |
|---|---|---|
| Almond Oil, Cetyl Alcohol, Vitamin E | 1.8 | nan |
| Almond Oil, Gum, Vitamin E | nan | 500.0 |
| Coconut Oil, Beeswax | 0.9 | nan |

Table 3: FTIR and HPLC Analysis

| Mixture | FTIR Peak (1/cm) | HPLC Concentration (mg/L) |
|---|---|---|
| Coconut Oil, Glycerin | 2000.0 | nan |
| Coconut Oil, Vitamin E | nan | 35.0 |

Table 4: Viscosity and Centrifugation

| Mixture | Viscosity (cP) | Centrifuge Speed (RPM) |
|---|---|---|
| Almond Oil, Beeswax, Vitamin E | 7108.72 | nan |
| Jojoba Oil, Vitamin E | 2567.33 | 12000.0 |

Observations

TheFour Ball Testerindicates a lower wear scar for Jojoba Oil alone, suggesting superior wear resistance. The UV-Vis Spectrophotometer showed higher absorbance in Almond Oil, Cetyl Alcohol, and Vitamin E mixture, implying more profound UV absorption. Thermal stability peaked at 72°C in Jojoba Oil, Beeswax, and Vitamin E, indicating potential usage in high-temperature formulations.

Interestingly, the FTIR analysis of Coconut Oil and Glycerin demonstrated significant spectral peaks at 2000 1/cm, which might be indicative of specific functional groups in the mixture. The HPLC results for Coconut Oil and Vitamin E denote a concentration of 35 mg/L, revealing a substantial presence of the antioxidant.

In terms of viscosity measurement, the highest viscosity was observed in Almond Oil, Beeswax, and Vitamin E, making it suitable for more viscous applications, whereas the centrifugal stability was most efficient in the Jojoba Oil, Cetyl Alcohol, and Glycerin mixture at 12000 RPM.

Conclusion

The experiments consistently underscored the unique properties of each mixture, influenced heavily by the constituent ingredients and their intrinsic properties. The findings of this report provide a clear insight into potential applications and formulation optimizations for each tested mixture.

Further studies, perhaps involving a broader range of temperatures and additional solvent interactions, may yield even more comprehensive understanding of these mixtures.

Note: This report may contain information not directly relevant to the key data provided, ensuring comprehensive documentation in line with standard laboratory reporting practices.