Laboratory Report: Chemical Analysis - Report\_586

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Introduction

This report details the comprehensive analysis of various oil-based samples combined with different additives. The purpose of these tests was to assess the physical and chemical properties of each sample using advanced instrumentation. Report 586 includes tests on a variety of mixtures, and each test is aimed at understanding the interactions and characteristics of the components involved. The complex nature of these samples requires detailed evaluation and interpretation.

Materials and Methods

The following instruments were employed in testing:

Each test was carried out under controlled environmental conditions to ensure accuracy and repeatability. Multiple samples were prepared, incorporating various combinations of oil, wax, alcohols, and other reagents to form eight distinct test samples.

Observations

The physical appearance of the samples varied significantly. Some mixtures displayed high viscosity, while others were more translucent in nature. Color changes were noted during spectrometric analysis, particularly in samples with beeswax components.

Results

The results of the chemical and physical property assessments are compiled below in Tables 1 and 2.

Table 1: Chemical Composition Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Composition** | **Instrument** | **Measurement** | **Unit** |
| Almond Oil, Cetyl Alcohol | pH Meter PH-700 | 7.2 | pH |
| Coconut Oil, Cetyl Alcohol | Gas Chromatograph GC-2010 | 350.0 | ppm |
| Almond Oil, Beeswax, Glycerin | HPLC System HPLC-9000 | 45.8 | mg/L |
| Jojoba Oil, Beeswax | NMR Spectrometer NMR-500 | 15.3 | ppm |
| Coconut Oil, Cetyl Alcohol | UV-Vis Spectrophotometer UV-2600 | 2.5 | Abs |
| Jojoba Oil, Beeswax | Liquid Chromatograph LC-400 | 250.0 | µg/mL |

Table 2: Physical Property Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Composition** | **Instrument** | **Measurement** | **Unit** |
| Almond Oil, Cetyl Alcohol, Glycerin | Conductivity Meter CM-215 | 1200.0 | µS/cm |
| Almond Oil, Cetyl Alcohol | Spectrometer Alpha-300 | 450.0 | nm |
| Almond Oil, Cetyl Alcohol, Glycerin | FTIR Spectrometer FTIR-8400 | 1600.0 | 1/cm |
| Almond Oil, Beeswax, Glycerin | Microplate Reader MRX | 3.1 | OD |
| Jojoba Oil, Gum, Glycerin | Viscometer VS-300 | 2038.18 | cP |
| Jojoba Oil, Gum | Viscometer VS-300 | 1997.75 | cP |

Analysis

A deeper understanding of the intricate mixture properties was realized through detailed spectrometric and chromatographic techniques. For instance, the pH value of the Almond Oil and Cetyl Alcohol mixture aligns with neutral characteristics crucial for cosmetic formulations. The conductivity of the same mixture increased with the addition of glycerin, indicating enhanced ionic content.

Moreover, the viscosity results were significant in the Jojoba Oil and Gum mixture, with values notably high, which suggests potential applicability in thixotropic products. The spectrometric data indicated specific wavelength absorption relevant for almond oil mixtures, showing characteristic peaks that correlate with known data for such compositions.

Conclusion

This detailed analysis sheds light on intricate interactions within oil-based systems. Each test provided indispensable data contributing to our understanding of these complex mixtures' potential applications in diverse industries, including pharmaceuticals and cosmetics. Challenges were encountered during measurement due to the mixtures' complex matrices, necessitating meticulous interpretation and validation processes. Future work should focus on expanding the range of additives to gain further insight into their influence on these systems.

Additional Notes

Most instruments utilized were calibrated before the tests. Some data inconsistencies were observed, possibly due to ambient temperature fluctuations. The impact of these variables was minimized through repeated trials. Notably, irrelevant data such as hypothetical sample names and unrelated datapoints are stored separately within our database.

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