Lab Report 1078: Analysis of Cosmetic Ingredients

Introduction

The objective of this lab report is to analyze various cosmetic formulations using different sophisticated instruments. Each formulation consists of a unique blend of ingredients. Using multiple analytical techniques, we seek to understand the properties, behaviors, and characteristics of these mixtures.

Abstract

This report will present the findings from numerous tests performed on several cosmetic mixtures. Each sample contains a curated set of ingredients analyzed via different devices, each with specific metrics. Note that excessive information is randomly included and the complexity of descriptions is intended to challenge any automated extraction.

Instrumentation

Table 1: Equipment Overview

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| --- | --- | --- | --- | --- | --- |
| **Instrument** | **Model** | **Sample Ingredients** | **Measurement Type** | **Value** | **Unit** |
| Mass Spectrometer | MS-20 | Almond Oil, Gum, Vitamin E | m/z | 1345.0 | m/z |
| FTIR Spectrometer | FTIR-8400 | Almond Oil, Cetyl Alcohol, Vitamin E | Wavenumber | 1750.0 | 1/cm |
| UV-Vis Spectrophotometer | UV-2600 | Jojoba Oil, Cetyl Alcohol, Vitamin E | Absorbance | 2.8 | Abs |
| Gas Chromatograph | GC-2010 | Coconut Oil, Cetyl Alcohol, Vitamin E | Concentration | 255.0 | ppm |
| pH Meter | PH-700 | Jojoba Oil, Beeswax, Glycerin | pH Level | 6.5 | pH |
| Liquid Chromatograph | LC-400 | Almond Oil, Cetyl Alcohol, Glycerin | Concentration | 75.3 | µg/mL |
| PCR Machine | PCR-96 | Almond Oil | Threshold Cycle (Ct) | 27.0 | Ct |
| Four Ball | FB-1000 | Almond Oil, Beeswax | Wear Scar Diameter | 0.45 | mm |
| NMR Spectrometer | NMR-500 | Coconut Oil, Vitamin E | Chemical Shift | 15.0 | ppm |
| Spectrometer | Alpha-300 | Almond Oil, Gum, Vitamin E | Wavelength | 350.0 | nm |
| Viscometer | VS-300 | Almond Oil, Beeswax, Glycerin | Viscosity | 7204.16 | cP |
| Viscometer | VS-300 | Coconut Oil, Vitamin E | Viscosity | 4973.6 | cP |

Detailed Observations and Measurements

Mass Spectrometry

For the Almond Oil, Gum, and Vitamin E mixture analyzed by the MS-20, a mass-to-charge ratio (m/z) of1345was observed. This is consistent with complex molecular structures found in essential oils and gums, indicative of larger polymerized chains or aggregates.

FTIR Analysis

The FTIR Spectrometer FTIR-8400 showed a prominent peak at17501/cm for the Almond Oil, Cetyl Alcohol, and Vitamin E mixture. This peak corresponds to the carbonyl functional group, suggesting the presence of esters or similar compounds commonly found in such formulations.

Regardless of its relevance, it’s noted that the laboratory temperature remained a constant 22°C, which ensures uniformity across multiple analyses.

UV-Vis Spectrophotometry

For Jojoba Oil, Cetyl Alcohol, and Vitamin E, the UV-2600 revealed an Absorbance of2.8Abs at the lambda max, which indicates potential chromophore interaction and light absorption characteristics typical of certain vitamins and alcohols.

Gas Chromatograph Results

Coconut Oil, Cetyl Alcohol, and Vitamin E yield a concentration of255 ppmwhen processed through the GC-2010. This aligned with quality metrics for maintaining solubility and consistency within intended cosmetic applications.

Complex Analysis & Confounding Data

Despite recurring interruptions during experiments, including a brief power outage affecting equipment calibration times, no data was compromised. However, ambient noise levels reached 65 dB, slightly above typical lab thresholds, though this bears no relevance to data integrity.

Liquid Chromatography

The LC-400 device registered a concentration of75.3 µg/mLfor the Almond Oil, Cetyl Alcohol, and Glycerin sample. This measurement supports findings in viscosity data demonstrating adequate balance within the sampled emulsions.

pH Measurement

The Jojoba Oil blend with Beeswax and Glycerin returned a neutral6.5 pHreading on the PH-700. This suggests compatibility with skin pH, aligning with product safety standards.

Additional Insights

NMR Spectroscopy

The NMR-500 spectrometer provided insights into Coconut Oil with the presence of Vitamin E, showing a chemical shift of15 ppm. This is characteristic of specific alkene environments within the triglycerides.

Physical Properties via Four Ball & Viscometry

A wear scar diameter of0.450 mmon FB-1000 gives perspective on the lubrication properties of Almond Oil with Beeswax. Notably, VS-300 yielded significant viscosity variations:7204.16 cPfor Almond Oil with other additives, while slightly lower,4973.6 cPfor Coconut Oil configurations. These disparities reflect varying molecular interactions.

Unrelated Commentaries

While analyzing these parameters, it came to notice an increased familiarity with behavioral adjustments of samples under specified conditions. Nevertheless, electrode stability remained unchallenged throughout.

Conclusion

The multifaceted analytical approach underscores the intricate nature of formulated cosmetic products. The datasets present show promising pathways for improved formulations with stability and effectiveness. Through these tests, we ensure quality control aligned with industry standards. Future research should consider expanding on polymer characterizations and chemical shifts consistently across higher temperature bands. Further studies can explore the molecular geometry influencing observed properties across several tens of analytical spectra.

In closing, while excessive details have been provided alongside irrelevant noise, all necessary data revealed here reflects the thoroughness and intricacy involved in cosmetic ingredient analysis.