Laboratory Analysis Report: Report\_621

Abstract

This report documents a series of analytical tests conducted on various oil-based mixtures. The primary objective was to determine specific chemical properties such as absorbance, mass-to-charge ratio, pH, concentration, cycle threshold value, and viscosity using advanced laboratory techniques. Each sample consists of a custom blend of ingredients tested cohesively.

Introduction

The study focuses on the analysis of organic compounds extracted from various sources including coconut, almond, and jojoba oils. The preparations also incorporate additional substances like beeswax, glycerin, cetyl alcohol, and vitamin E. Our investigation employed six methodologies, each offering unique insights into the behaviors and characteristics of these complex mixtures.

Materials and Methods

Analytical Equipment and Techniques:

Used to measure the absorbance of a mixture containing coconut oil and cetyl alcohol.

Mass Spectrometer (MS-20):

Implemented for identifying the mass-to-charge (m/z) ratio of compounds in a blend of coconut oil, beeswax, and glycerin.

pH Meter (PH-700):

Measured the acidity/alkalinity of a mixture comprising almond oil and glycerin.

Liquid Chromatograph (LC-400):

Determined the concentration in micrograms per milliliter of jojoba oil and glycerin.

PCR Machine (PCR-96):

Assessed the cycle threshold (Ct) value of coconut oil, providing an indirect measure of nucleic acid amplification.

Gas Chromatograph (GC-2010):

Analyzed the parts per million (ppm) concentration of a coconut oil, beeswax, and glycerin mixture.

Viscometer (VS-300):

Results and Discussion

Table 1: Chemical Properties and Observations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample ID** | **Sample Components** | **Method** | **Measurement** | **Unit** |
| Sample\_1 | Coconut Oil, Cetyl Alcohol | UV-Vis Spec UV-2600 | 1.8 | Abs |
| Sample\_2 | Coconut Oil, Beeswax, Glycerin | Mass Spec MS-20 | 1275.4 | m/z |
| Sample\_3 | Almond Oil, Glycerin | pH Meter PH-700 | 6.5 | pH |
| Sample\_4 | Jojoba Oil, Glycerin | Liquid Chrom LC-400 | 250.75 | µg/mL |
| Sample\_5 | Coconut Oil | PCR Machine PCR-96 | 25.0 | Ct |
| Sample\_6 | Coconut Oil, Beeswax, Glycerin | Gas Chrom GC-2010 | 450.9 | ppm |
| Sample\_7 | Almond Oil, Cetyl Alcohol, Vitamin E | Viscometer VS-300 | 7161.44 | cP |

Observation 1: The UV-Vis spectrophotometry test indicated that the coconut oil and cetyl alcohol mix absorbs significantly at a wavelength range suggestive of unsaturated bonds.

Observation 2: The mass spectrometry analysis highlighted a dominant m/z peak of 1275.4, corresponding to complex molecular structures possibly involving triglycerides in coconut oil and accompanying components.

Miscellaneous Information

During the analysis, an unexpected transient power fluctuation was noted but did not hamper data integrity due to the lab's backup systems. Additionally, a comparison to historic data suggested a steady consistency in the spectral outputs over recent studies.

Table 2: Viscosity Insights

|  |  |  |
| --- | --- | --- |
| **Component Mixtures** | **Viscosity Measurement** | **Conclusion** |
| Almond Oil, Cetyl Alcohol, Vitamin E | 7161.44 cP | High Viscosity |

Complex Description: The viscosity of the almond oil-based mixture demonstrated a high internal resistance to flow, indicative of inter-molecular interactions dominated by cetyl alcohol and stabilized by vitamin E’s presence. The composite nature of this blend alludes to potential applications in topical formulations where spreadability is crucial.

Conclusion

The methodology provided crucial information about each sample's chemical and physical properties. For instance, the differing pH levels could infer the mixture's stability and potential for skin irritation. Mass spectrometry and GC highlighted the complexity of the molecular weight distribution and concentration, essential for quality assessment of raw materials. Each technique underscored its pivotal role in the detailed evaluation of these oil-based systems.

Addendum

It is advisable to further investigate the implications of variable humidity and temperature conditions, which were held constant in this study, to better understand their effects on the measurement outcomes.