Lab Report: Analysis of Various Mixtures (Report ID: 2318)

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Introduction

The objective of this series of experiments was to analyze the physical and chemical properties of various oil-based mixtures using different laboratory instruments. Each test involved a unique set of ingredients, focusing on common additives such as Coconut Oil, Cetyl Alcohol, Vitamin E, and others. The analyses helped determine specific characteristics like conductivity, PCR efficiency, UV-Vis absorbance, ionic concentration, and viscosity.

Methodology

A set of mixtures was prepared with the combinations of ingredients listed in the key. Each mixture was submitted to a variety of tests to examine different physical and chemical properties using sophisticated analytical instruments.

Test Observations and Results

Conductivity Analysis

Conductivity measurements were recorded for the mixtures containing Coconut Oil and Cetyl Alcohol. The tests employed the Conductivity Meter CM-215:

Despite the similar composition, Sample 1 showed a higher conductivity, possibly due to the Vitamin E's influence on ionic movement.

Polymerase Chain Reaction (PCR) Cycle Thresholds

PCR efficiency was evaluated using the PCR Machine PCR-96:

The mixture with gum and glycerin exhibited a lower Ct value, implying a faster amplification process.

UV-Vis Spectroscopy

The UV-Vis Spectrophotometer UV-2600 was used to determine absorbance at a fixed wavelength:

Higher absorbance for Sample 6 suggests better light scattering or absorption properties.

Ionic Concentration

Ionic concentration was analyzed using the Ion Chromatograph IC-2100:

The almond oil mixture had a notably higher ionic content, which could influence its electrochemical reliability.

Viscosity Measurements

Viscosity was gauged using the Viscometer VS-300, providing insight into the fluid dynamics of the mixtures:

Jojoba oil mixtures were substantially less viscous, indicating better flow properties for applications requiring mobility.

Irrelevant Observations

During these experiments, various anomalies like unexpected temperature variations and non-uniform mixing were logged. However, these were deemed inconsequential to the final results.

Data Presentation

Table 1: Measurement and Analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample** | **Ingredients** | **Instrument** | **Measurement** | **Unit** |
| 1 | Coconut Oil, Cetyl Alcohol, Vit E | Conductivity Meter CM-215 | 1500 | µS/cm |
| 2 | Coconut Oil, Cetyl Alcohol | Conductivity Meter CM-215 | 1250 | µS/cm |
| 3 | Almond Oil, Beeswax, Vitamin E | PCR Machine PCR-96 | 32 | Ct |
| 4 | Almond Oil, Gum, Glycerin | PCR Machine PCR-96 | 28 | Ct |

Table 2: Spectroscopy and Viscosity Data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample** | **Ingredients** | **Instrument** | **Measurement** | **Unit** |
| 5 | Coconut Oil, Beeswax, Vitamin E | UV-Vis Spectrophotometer UV-2600 | 2.3 | Abs |
| 6 | Almond Oil, Cetyl Alcohol, Vit E | UV-Vis Spectrophotometer UV-2600 | 3.1 | Abs |
| 7 | Jojoba Oil, Gum, Glycerin | Ion Chromatograph IC-2100 | 12.5 | mM |
| 8 | Almond Oil | Ion Chromatograph IC-2100 | 16.0 | mM |
| 9 | Coconut Oil | Viscometer VS-300 | 4843.26 | cP |
| 10 | Jojoba Oil, Beeswax, Glycerin | Viscometer VS-300 | 2834.46 | cP |
| 11 | Jojoba Oil, Gum, Glycerin | Viscometer VS-300 | 1880.21 | cP |

Conclusion

The conducted experiments revealed significant variations in the physical and chemical properties of the different mixtures. These insights can inform the formulation processes in various industrial applications. Future work could delve into exploring the effects of these properties on large-scale manufacturing and product sustainability.

Notes

This report is part of ongoing research to better understand the intricate dynamics of mixed ingredient formulations.