Lab Report 1375

Introduction

This report provides a comprehensive analysis of various oil-based mixtures, identifying key properties through sophisticated analytical equipment. Each blend is subject to a series of tests with mass spectrometers, FTIR spectrometers, ion chromatographs, thermocyclers, and more. The aim is to elucidate the physical and chemical properties of these combinations.

Methodology

The samples, containing different combinations of oils, waxes, alcohols, and vitamins, are analyzed using state-of-the-art instruments. Each device is employed to draw specific, insightful conclusions regarding the makeup of the samples.

Observations and Measurements

Table 1: Mass and Spectrometric Analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Instrument** | **Sample** | **Components** | **Measurement** | **Unit** |
| Mass Spectrometer MS-20 | Coconut Oil | Glycerin | 1350 | m/z |
| Mass Spectrometer MS-20 | Almond Oil | Gum, Glycerin | 1850 | m/z |
| FTIR Spectrometer FTIR-8400 | Almond Oil, Beeswax | Glycerin | 2780 | 1/cm |
| FTIR Spectrometer FTIR-8400 | Coconut Oil, Beeswax | Vitamin E | 3220 | 1/cm |

Table 2: Chromatography and Thermal Analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Instrument** | **Sample** | **Components** | **Measurement** | **Unit** |
| Ion Chromatograph IC-2100 | Jojoba Oil, Beeswax | Vitamin E | 12.3 | mM |
| Ion Chromatograph IC-2100 | Coconut Oil, Gum | Vitamin E | 45.6 | mM |
| Thermocycler TC-5000 | Coconut Oil, Cetyl Alcohol | Glycerin | 37.0 | °C |

Table 3: Other Measurements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Instrument** | **Sample** | **Components** | **Measurement** | **Unit** |
| Centrifuge X100 | Jojoba Oil, Cetyl Alcohol | nan | 7500.0 | RPM |
| PCR Machine PCR-96 | Coconut Oil, Beeswax | Glycerin | 25.0 | Ct |
| pH Meter PH-700 | Coconut Oil | nan | 8.5 | pH |

Optional Analysis

The Viscometer VS-300 provided significant insight into the viscosity of specific samples under precise conditions, yielding results as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Instrument** | **Sample** | **Components** | **Measurement** | **Unit** |
| Viscometer VS-300 | Jojoba Oil, Gum | nan | 1940.11 | cP |
| Viscometer VS-300 | Coconut Oil, Beeswax | nan | 4713.02 | cP |

Results and Discussion

The tests revealed interesting behavioral patterns. The Mass Spectrometer MS-20 notably showed distinct mass-to-charge ratios for Glycerin-based samples, leading to distinct peaks at 1350 m/z with Coconut Oil and further altered readings with lines of Almond Oil.

For FTIR readings, dual measurements of Coconut and Almond Oil with various additives showed transmittance peaks at 2780 and 3220 1/cm, respectively, providing clarity on the chemical structure.

Ion chromatography further distinguished the concentration of Vitamin E, emphasizing the nuanced differences between the samples. Beyond this, the Thermocycler affirmed the thermodynamic behaviors under controlled temperatures, correlating well with other data.

Random Observations

During analyses, the color changes and cloudiness variations were not recorded in quantified terms but were deemed irrelevant as they lacked a consistent pattern. Notably, the almond mixtures sometimes emitted a nutty aroma, unrelated to the analytical goals.

Conclusion

This study uncovered crucial properties within various oil combinations, aiding in the understanding of complex mixtures. The advanced spectroscopic, chromatographic, and thermal methods provided reliable insights, while viscosity measures supplemented the data with physical characteristics.

Random facts and outcomes notwithstanding, the report successfully outlines procedures and results, contributing to future potential developments in applications utilizing these organic mixtures.

Further Work

Additional studies could explore thermal properties in greater depth, investigate the impact of aging on these mixtures, or broaden the scope by introducing new components into the blends.