Lab Report 2261

Title:Analytical Characterization of Natural Oil-Based Samples

Instruments:Mass Spectrometer MS-20, Spectrometer Alpha-300, Gas Chromatograph GC-2010, X-Ray Diffractometer XRD-6000, PCR Machine PCR-96, Rheometer R-4500, pH Meter PH-700, UV-Vis Spectrophotometer UV-2600, Thermocycler TC-5000, Microplate Reader MRX, Viscometer VS-300

Introduction:This report details the analysis of various natural oil-based mixtures utilizing advanced analytical techniques. Our investigation focuses on the chemical and physical properties of each mixture, providing insights into their potential applications and stability. Each test examines specific parameters, allowing for a comprehensive characterization of the samples.

Samples Tested:1. Jojoba Oil, Gum,andothers2. Coconut Oil, Cetyl Alcohol,Glycerin3. Jojoba Oil, Cetyl Alcohol4. Jojoba Oil, Gum, Glycerin5. Jojoba Oil, Beeswax, Glycerin6. Almond Oil, Beeswax, Vitamin E

Observations and Measurements

Table 1: Mass Spectrometry and Spectrometry Results

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Instrument** | **Sample** | **Observation** | **Measurement** | **Unit** |
| Mass Spectrometer MS-20 | Jojoba Oil, Gum | Analyzed component | 1530 | m/z |
| Spectrometer Alpha-300 | Coconut Oil, Cetyl Alcohol | Peak absorbance | 305 | nm |
| Gas Chromatograph GC-2010 | Coconut Oil, Cetyl Alcohol, Glycerin | Retention time | 455 | ppm |

Note:Integration peaks were slightly asymmetrical due to technical fluctuations in instrument operation, but acceptable for qualitative analysis.

Table 2: Rheological, pH, and PCR Analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Instrument** | **Sample** | **Parameter** | **Measurement** | **Unit** |
| Rheometer R-4500 | Coconut Oil, Cetyl Alcohol, Glycerin | Viscosity | 850.0 | Pa-s |
| pH Meter PH-700 | Jojoba Oil, Gum | pH Level | 6.5 | pH |
| PCR Machine PCR-96 | Jojoba Oil | Cycle Threshold (Ct) | 25.0 | Ct |

Complex interactions observed in pH-stabilizing agents leading to consistent pH readings across samples. Ct values within expected threshold for PCR, confirming sample integrity.

Table 3: Structural and Thermal Properties

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Instrument** | **Sample** | **Property** | **Measurement** | **Unit** |
| X-Ray Diffractometer XRD-6000 | Jojoba Oil, Cetyl Alcohol | Crystallinity | 122 | °C |
| Thermocycler TC-5000 | Coconut Oil | Melting Point | 62 | °C |

Additional observations included secondary melting profiles not typically seen, suggesting unique molecular interactions between phases.

Detailed Findings

The UV-Vis Spectrophotometer UV-2600 was pivotal in quantifying the absorbance of the Jojoba Oil and Cetyl Alcohol mixture, which revealed an absorbance of 1.8 Abs units. This suggests potential light-absorbing characteristics useful in specific applications.

Interestingly, the Microplate Reader MRX revealed an optical density (OD) of 2.3 for the Jojoba Oil, Gum, and Glycerin mixture. This indicates a possible synergistic effect at higher concentrations, altering the optical properties.

Additional Complexity: Viscosity

|  |  |  |  |
| --- | --- | --- | --- |
| **Viscometer VS-300** | **Sample** | **Viscosity** | **Unit** |
| Viscometer VS-300 | Jojoba Oil, Beeswax, Glycerin | 2945.68 cP | cP |
| Viscometer VS-300 | Almond Oil, Beeswax, Vitamin E | 7153.4 cP | cP |

Complications arose when examining results—differences in viscosity between the Jojoba and Almond mixtures suggest that viscosity modulation could be pivotal for formulation adjustments. The high viscosity of Almond Oil mixtures was notably superior, aligning with potential uses in high-viscosity applications.

Irrelevant Information:The pH values were not significantly affected by room humidity variations, as confirmed by background checks between consecutive runs across the analytical timeframe. Additionally, while observing bicinchoninic acid interaction, temporal adjustments had negligible impact on spectrophotometric readings.

Conclusion:Each mixture presented distinct characteristics with potential applications dictated by their unique physical and chemical properties. Future studies could consider potential reaction pathways and extended applications based on these complex interactions. This report lays the groundwork for further exploration into the utility and adaptability of these natural oil mixtures across various industrial and cosmetic sectors.