Laboratory Report 1634

Introduction

The primary aim of this experiment was to analyze various compound mixtures using multiple analytical techniques. A series of tests were conducted on mixtures containing essential oils, waxes, and vitamins to evaluate their chemical properties using advanced laboratory equipment. The tests included Mass Spectrometry, NMR Spectroscopy, pH measurement, High-Performance Liquid Chromatography (HPLC), Liquid Chromatography (LC), Polymerase Chain Reaction (PCR), Gas Chromatography (GC), and Viscosity measurements. Each analysis offered unique insights into the molecular composition and behavior of the mixtures under study.

Equipment and Methods

Each set of samples was meticulously prepared to ensure representative analysis. The equipment was calibrated according to manufacturer's specifications prior to use. Additionally, irrelevant equipment such as random number generators and unrelated software was also present in the lab, but not used directly in these tests.

Results

Mass Spectrometry Analysis

Table 1: Mass Spectrometry Results

|  |  |  |
| --- | --- | --- |
| **Sample** | **Compound** | **m/z** |
| Jojoba Oil, Vitamin E | Vitamin E | 1500 |

Observation: The mass spectrometry analysis of the Jojoba Oil and Vitamin E mixture revealed a significant presence of Vitamin E with an m/z ratio of 1500, indicating a high molecular weight fragment suggestive of complex molecular structures.

NMR Spectroscopy Analysis

Table 2: NMR Spectroscopy Results

|  |  |  |
| --- | --- | --- |
| **Sample** | **Compounds** | **ppm** |
| Jojoba Oil, Cetyl Alcohol, Glycerin | Jojoba Oil, Cetyl Alcohol, Glycerin | 10 |

Observation: Proton NMR spectroscopy yielded peaks concentrated around 10 ppm, implying shifts characteristic of alkyl chains, possibly indicating strong Van der Waals interactions between Cetyl Alcohol and the unsaturated components of Jojoba Oil.

pH Measurement

Table 3: pH Results

|  |  |  |
| --- | --- | --- |
| **Sample** | **Compounds** | **pH** |
| Almond Oil, Beeswax | Vitamin E | 7 |

Observation: The pH analysis confirmed a neutral pH of 7 for the Almond Oil, Beeswax, and Vitamin E sample, which may be indicative of balanced acidity and basicity in the mixture.

High-Performance Liquid Chromatography (HPLC)

Table 4: HPLC Results

|  |  |  |
| --- | --- | --- |
| **Sample** | **Compounds** | **mg/L** |
| Jojoba Oil, Cetyl Alcohol | Vitamin E | 500 |

Observation: The presence of Vitamin E at a concentration of 500 mg/L in the Jojoba Oil and Cetyl Alcohol mixture underscores the efficacy of HPLC in quantifying dissolved organic compounds.

Liquid Chromatography

Table 5: Liquid Chromatography Results

|  |  |  |
| --- | --- | --- |
| **Sample** | **Compounds** | **ug/mL** |
| Jojoba Oil, Gum | Jojoba Oil | 200 |

Observation: Liquid Chromatography analysis identified Jojoba Oil concentrations of 200 ug/mL, highlighting the amount of gum derivatives interacting within the oil medium.

PCR Analysis

Table 6: PCR Results

|  |  |  |
| --- | --- | --- |
| **Sample** | **Compound** | **Ct** |
| Jojoba Oil, Vitamin E | Vitamin E | 25 |

Observation: The PCR analysis provided a cycle threshold (Ct) value of 25, suggesting high amplification efficiency, particularly for Vitamin E sequences within Jojoba Oil.

Gas Chromatography

Table 7: Gas Chromatography Results

|  |  |  |
| --- | --- | --- |
| **Sample** | **Compounds** | **ppm** |
| Jojoba Oil, Cetyl Alcohol, Glycerin | Jojoba Oil, Cetyl Alcohol | 350 |

Observation: The volatile analysis confirmed the presence of 350 ppm of Jojoba Oil and Cetyl Alcohol, indicating lower volatility for these mixtures.

Viscosity Measurement

Table 8: Viscosity Results

|  |  |  |
| --- | --- | --- |
| **Sample** | **Compounds** | **cP** |
| Almond Oil, Beeswax | Vitamin E | 7204.35 |

Observation: Viscosity measurements showed a value of 7204.35 cP for the Almond Oil, Beeswax, and Vitamin E mixture, indicating a highly viscous oil suitable for cosmetic applications.

Conclusion

This comprehensive analysis provides essential insights into the properties of different oil mixtures. Each piece of equipment offered distinctive data, which together present a holistic portrait of compound interactions within organic mixtures. The results can inform future research and product formulation in multiple industries, notably cosmetics and nutraceuticals. Unrelated findings, such as erroneous signals from unused heating elements, were duly ignored and omitted from final tabulations.