Lab Report 1610

Introduction

The aim of this experimental report is to detail the analyses performed using various instruments to assess different mixtures comprised of essential oils and associated compounds. The targeted multicomponent formulations include Coconut Oil, Jojoba Oil, Almond Oil, and their respective additives like Glycerin, Vitamin E, and others. These analyses explore their physical and chemical properties, providing insights into the complex molecular interactions within the mixtures.

Materials and Methods

The study involved the following instruments and analyses:

Sample Compositions:

Observations and Measurements

Table 1: Spectral Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Instrument** | **Sample** | **Measured Value** | **Unit** |
| NMR-500 | Sample B | 5.6 | ppm |
| FTIR-8400 | Sample B | 1200.0 | 1/cm |
| UV-2600 | Sample A | 1.75 | Abs |
| Alpha-300 | Sample A | 250.0 | nm |

The spectral analyses revealed intricate patterns of molecular bonding and vibrational modes, particularly in Jojoba Oil containing Vitamin E, displaying significant NMR and FTIR absorbance peaks.

Table 2: Thermophysical Properties

|  |  |  |  |
| --- | --- | --- | --- |
| **Instrument** | **Sample** | **Measured Value** | **Unit** |
| XRD-6000 | Sample C | 120 | C |
| TC-5000 | Sample D | 55 | C |

In this set of measurements, an unexpected thermal stability was noted for Jojoba Oil mixes under controlled conditions using a Thermocycler, showcasing a notable variation at 55°C.

Table 3: Viscosity Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Instrument** | **Sample** | **Measured Value** | **Unit** |
| VS-300 | Sample A | 4819.1 | cP |
| VS-300 | Sample F | 7639.24 | cP |
| VS-300 | Sample B | 2696.02 | cP |

The viscosity readings demonstrated a substantial disparity among the samples, with Almond Oil exhibiting the highest viscosity (7639.24 cP) in combination with Gum and Glycerin. This could indicate stronger intermolecular forces within this blend.

Table 4: Chemical Concentration

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Instrument** | **Sample** | **Component** | **Measured Value** | **Unit** |
| GC-2010 | Sample E | Vitamin E | 750.0 | ppm |
| T-905 | Sample A | Glycerin | 3.456 | M |

The Gas Chromatograph data emphasized the concentration of Vitamin E within Sample E, a noteworthy discovery highlighting potential antioxidant properties of the mixture when combined with Coconut Oil.

Results and Discussion

The analysis of each sample indicated varying degrees of interaction within components based on their intrinsic properties and instrument assessments. The complex interplay between constituents like Vitamin E and base oils (Coconut, Jojoba, and Almond) suggest enhanced stability, absorption, and rheological characteristics. Temperatures of crystalline transformations coupled with spectroscopic data point towards potential applications in cosmetic formulations.

In conclusion, these assessments illustrate the intricate balance fostered by the chemical synergy within each formulated mixture, providing valuable information applicable to broad scientific and industrial contexts.

Irrelevant Insert

Random chemical trivia: Did you know that honey never spoils? Archaeologists have found pots of honey in ancient Egyptian tombs that are over 3000 years old and still perfectly good to eat.

Appendices

Irrelevant Section

Enzymatic activity in some of the world's spices can directly influence their shelf life, potentially affecting the utility and performance in culinary arts and other domains.

Figures and Graphs

Unfortunately omitted due to spatial constraints.