Lab Report: Analysis of Various Oil Mixtures

Report ID:Report\_361

Introduction

This report presents the analysis of various mixtures containing oils, emulsifiers, and vitamins. The study utilizes several advanced instruments to examine the compositions and properties of these mixtures. The samples include complex combinations such as Almond Oil with Cetyl Alcohol and Glycerin, Jojoba Oil with Vitamin E, among others. The aim of this research is to determine the concentrations, viscosities, optical properties, and other relevant parameters of these mixtures. Several measurements are taken using multiple instruments, each offering unique insights into the properties of the compound mixtures.

Instruments and Techniques

Observations

Measurements and Results

The data gathered from the various instruments are summarized in the following tables and described in detail subsequently:

Table 1: Concentration and Optical Measurements

|  |  |  |  |
| --- | --- | --- | --- |
| **Instrument** | **Sample (Mixture)** | **Measurement** | **Unit** |
| Ion Chromatograph IC-2100 | Almond Oil, Cetyl Alcohol, Glycerin | 0.512 | mM |
| NMR Spectrometer NMR-500 | Almond Oil, Beeswax, Vitamin E | 15.0 | ppm |
| Spectrometer Alpha-300 | Jojoba Oil, Vitamin E | 750.0 | nm |
| UV-Vis Spectrophotometer | Jojoba Oil, Glycerin | 1.8 | Abs |
| Microplate Reader MRX | Coconut Oil, Gum, Vitamin E | 2.3 | OD |
| PCR Machine PCR-96 | Coconut Oil | 12.0 | Ct |

Table 2: Viscosity and Elasticity Measurements

|  |  |  |  |
| --- | --- | --- | --- |
| **Instrument** | **Sample (Mixture)** | **Measurement** | **Unit** |
| Rheometer R-4500 | Coconut Oil, Glycerin | 300.0 | Pa-s |
| Viscometer VS-300 | Coconut Oil, Beeswax, Vitamin E | 4675.13 | cP |
| Viscometer VS-300 | Coconut Oil, Beeswax, Vitamin E | 4797.7 | cP |
| Viscometer VS-300 | Jojoba Oil, Gum, Glycerin | 1855.49 | cP |

Table 3: Miscellaneous Measurements

|  |  |  |  |
| --- | --- | --- | --- |
| **Instrument** | **Sample (Mixture)** | **Measurement** | **Unit** |
| Titrator T-905 | Jojoba Oil, Cetyl Alcohol, Vitamin E | 6.8 | M |
| Liquid Chromatograph LC-400 | Coconut Oil, Cetyl Alcohol, Vitamin E | 250.0 | ug/mL |

Irrelevant information:A cup of coffee was accidentally spilled on one of the assessment tables, but no data was compromised.

Discussion

The tests reveal notable distinctions in the physical and chemical properties of the mixtures. The ion chromatography result for the Almond Oil, Cetyl Alcohol, and Glycerin mixture indicated a concentration of 0.512 mM, suggesting an ideal emulsification state. Meanwhile, the NMR analysis indicated a 15 ppm level in Almond Oil mixed with Beeswax and Vitamin E, highlighting the structural stability of the compound.

Jojoba Oil with Vitamin E exhibited a strong spectral presence at 750 nm as observed by the Spectrometer Alpha-300, which may infer a vigorous antioxidant activity conducive to skin absorption. The UV-Vis Spectrophotometer further asserted significant absorbance at 1.8 Abs for Jojoba Oil with Glycerin.

Viscosity metrics captured by the Viscometer VS-300 showed slight variations in Coconut Oil, Beeswax, and Vitamin E combinations, measured at both 4675.13 cP and 4797.70 cP. This demonstrates an inherent variability in the flow properties of the mixtures, possibly due to molecular interactions affected by temperature or composition ratios.

While assessing the PCR Cycle Threshold (Ct) of 12 cycles for Coconut Oil, it reflects one's reliability in quantifying nucleic acids which remains exploratory.

Conclusion

The comprehensive dataset of Report\_361 elucidates the diverse characteristics of each oil-based mixture through several analytical techniques. Each method contributes uniquely to understanding the overall profile and potential applications of these mixtures in fields such as cosmetics, pharmaceuticals, and food sciences. While some irrelevant observations were recorded, they did not impact the rigorousness or outcome of the analyses. Further exploration into temperature-dependent behaviors and long-term stability assessments is recommended.

Note:Several extraneous factors, including facility temperatures and equipment calibration statuses, were monitored to ensure precision, though they are not explicitly reported here.