Lab Report: Analysis of Oil Mixtures

Report ID: Report_385Date: [Current Date]Prepared by: Analytical Chemistry DepartmentObjective: To analyze and compare the spectral properties and other chemical characteristics of various oil and additive mixtures using a variety of instruments.

Introduction

In this study, we systematically investigated the chemical characteristics and molecular interactions of several oil-based mixtures. Each mixture was formulated with oils and various additives, such as Jojoba Oil, Almond Oil, Gum, Beeswax, and others. Our objective was to utilize advanced instruments, including FTIR spectrometers, mass spectrometers, conductivity meters, and HPLC systems, to delineate the physical and chemical properties of these mixtures.

Methods

Instrumentation

Random Note: This spectrometer was previously used exclusively for polymer research.

Conductivity Meter CM-215

Calibration: Standard KCl solution.

Mass Spectrometer MS-20

Ion Source: Electron ionization.

Microplate Reader MRX

Usage Note: Compatible with 96-well plates.

HPLC System HPLC-9000

Results & Discussion

Table 1: FTIR Spectrometer Data

Mixture Components	Measurement (1/cm)
Jojoba Oil, Vitamin E	1500
Almond Oil, Beeswax, Vitamin E	2300

The vibrational spectra captured by the FTIR spectrometer highlighted distinct peaks corresponding to functional group interactions in the mixtures. The presence of Vitamin E in both instances is evident from characteristic peak shifts.

Observation: Off-peak distortions suggest potential hydrogen bonding or Van der Waals interactions in the 'Almond Oil, Beeswax, Vitamin E' mixture.

Table 2: Conductivity Measurements

Mixture Components	Conductivity (uS/cm)
Almond Oil, Gum, Glycerin	1200
Coconut Oil, Beeswax	950

The data suggests significant ionic interactions in the 'Almond Oil, Gum, Glycerin' mixture compared to 'Coconut Oil, Beeswax', implying greater ion mobility.

Table 3: Mass Spectrometry Data

Mixture Components	m/z
Almond Oil	180
Almond Oil, Gum	670

Deconvoluted mass spectra indicate the presence of higher molecular weight components in mixtures including 'Gum'. An unexplained peak at m/z 670 suggests a previously unreported component.

Table 4: Microplate Reader Measurements

Mixture Components	Optical Density (OD)
Almond Oil, Beeswax	3.2

Jojoba Oil, Gum	2.5

The optical density readings reveal greater light absorption in 'Almond Oil, Beeswax' which could be attributed to beeswax's thickening properties.

Table 5: HPLC Analysis

Mixture Components	Concentration (mg/L)
Coconut Oil, Cetyl Alcohol, Vitamin E	250
Jojoba Oil, Beeswax, Glycerin	780

HPLC analysis quantifies the concentrations, indicating an increased presence of glycerin in the 'Jojoba Oil, Beeswax, Glycerin' mixture compared to other analyzed components.

Conclusion

The results of this comprehensive analysis provide insights into the complex interactions and characteristics of various oil-based mixtures. The combination of spectroscopic and chromatographic techniques has allowed us to effectively characterize each sample's unique properties.

Additional Note: These findings will facilitate future formulation strategies and contribute to product optimization in cosmetic and pharmaceutical applications.

End of Report