Lab Report 1029

Introduction

The purpose of this study is to analyze the properties of various natural oil mixtures using a range of advanced analytical techniques. Testing was conducted using FTIR Spectrometry, Gas Chromatography, Liquid Chromatography, and other methods to provide comprehensive insights into the composition and properties of each mixture.

Methodology

The test samples were prepared by mixing defined quantities of oil with secondary substances as specified in the sample preparation table. Numerous analytical instruments were employed for a variety of tests, focusing on identifying key attributes such as composition, concentration, and physical properties. Each sample's unique characteristics were then theoretically examined.

Observations and Measurements

The tests were conducted multiple times to ensure accuracy and reliability, and all results were recorded. Here are the detailed descriptions of the tests conducted and their respective outcomes.

Sample Preparation

The components used for each sample test are depicted in Table 1. Mixtures were created with meticulous attention to ensure uniform distribution. Any discrepancies in homogeneity were corrected before analysis.

Table 1: Sample Composition

Sample ID	Main Component	Additives
Sample A	Coconut Oil	Beeswax
Sample B	Jojoba Oil	Glycerin
Sample C	Coconut Oil	Cetyl Alcohol
Sample D	Jojoba Oil	Beeswax, Vitamin E

Sample E	Coconut Oil	Gum, Glycerin
Sample F	Jojoba Oil	nan
Sample G	Almond Oil	Gum, Vitamin E

Analytical Results

Instrumental and Chemical Analysis

The analysis involved instruments like FTIR Spectrometer, Gas Chromatograph, and Liquid Chromatograph. Their parameters were tailored for optimal sensitivity and selectivity specific to each sample's composition.

Table 2: Results Overview

Instrument	Sample ID	Measurement Type	Result	Unit
FTIR Spectrometer	A	Wavenumber	2890.0	1/cm
Gas Chromatograph	B	Concentration	750.0	ppm
Liquid Chromatograph	C	Concentration	300.0	ug/mL
Spectrometer	D	Wavelength	550.0	nm
Microplate Reader	E	Optical Density	3.5	OD
Conductivity Meter	F	Conductivity	1200.0	uS/cm
Viscometer	G	Viscosity	7592.5	cP

Descriptive Analysis

FTIR Analysis of Sample A: The Coconut Oil and Beeswax mixture showed a distinctive absorption peak at 2890 1/cm. This suggests a strong C-H stretch, commonly associated with alkane groups in organic compounds.

Gas Chromatography of Sample B: Jojoba Oil and Glycerin exhibited significant peaks at 750 ppm. The analysis suggests stable glycerin retention, an indicator of possible ester formation.

Liquid Chromatography of Sample C: The presence of Cetyl Alcohol in Coconut Oil presented a quantifiable concentration of 300 ug/mL, indicating successful interaction among the mixture's components.

Spectrometric Analysis of Sample D: The combination involving Vitamin E displayed a crucial peak at 550 nm, likely associated with the antioxidant properties facilitating energy absorbance.

Optical Measurement of Sample E: For the sample containing Gum and Glycerin, the optical density of 3.5 OD correlates with increased viscosity and potential emulsification within the matrix.

Conductivity of Sample F: Jojoba Oil without additives showed a high conductivity of 1200 uS/cm, hinting at ionic potential increase due to oil polymerization.

Viscosity in Sample G: A prominent viscosity value of 7592.5 cP for the Almond Oil composite suggests significant rheological behavior changes, potentially due to microstructural transformations.

Discussion

Anomalies were minor and did not affect the overall dataset integrity. Variations in measurement accuracy across different samples were expected and can be attributed to intrinsic differences in analyte interaction with respective matrices. The incorporation of Beeswax and Vitamin E provides enhanced antioxidative characteristics, particularly visible in spectral readings. More unforeseen was the strong conductivity in unadulterated Jojoba Oil.

Conclusion and Recommendations

The study successfully outlined the diverse properties and potential stability characteristics of natural oil mixtures across various analytical platforms. Future studies should consider cross-technique validations for more robust data interpretation when applying these findings to industrial product formulation.

Please refer to appendix sections for raw data, calibration curves, and extended method descriptions.