

Title: Analysis of Various Oil Mixtures Using Multiple Analytical Instruments

Purpose:This lab report investigates the composition and characteristics of different oil-based mixtures. Specifically, the analysis focused on blends containing Almond Oil, Jojoba Oil, and Coconut Oil, combined with substances like Cetyl Alcohol, Glycerin, Beeswax, and Vitamin E. Various techniques were employed to evaluate the chemical and physical properties of these mixtures.

Instrumentation and Methodology

A diverse set of state-of-the-art analytical instruments was utilized, each selected for its ability to yield specific insights into the composition of the test samples.

Equipment List:

Test Samples and Mixtures:

Samples were prepared by blending various oils and substances:

Observations and Measurements

Various analytical techniques were employed to assess compound concentration, viscosity, thermal properties, chemical shifts, and molecular weight distributions.

Table 1: Chromatographic and Spectroscopic Analysis

	Instrument	Sample	Component Analyzed	Observation	Measurement	Units
Gas	Chromatograph GC-2010	Sample A	Cetyl Alcohol	Clear peak observed	523.4	ppm
Ion	Chromatograph IC-2100	Sample A	Glycerin	Stable retention time	29.8	mM
NMR	Spectrometer NMR-500	Sample A	Cetyl Alcohol	Proton shift detected	7.9	ppm
Mass	Spectrometer MS-20	Sample B	Glycerin	Peak at 800.1	800.1	m/z

PCR Machine	PCR-96	Sample A	Glycerin	Amplification detected	22.4	Ct
	HPLC System	HPLC-9000	Sample D	Vitamin E	Distinct peak	450.2
mg/L						

Table 2: Physical and Thermal Characterization

Instrument		Sample	Component	Observation	Measurement	Units
Rheometer	R-4500	Sample B	Jojoba Oil	Uniform flow detected	145.6	Pa-s
	X-Ray Diffractometer	XRD-6000	Sample C	Beeswax	Crystalline structure	120.3
C						
Thermocycler		TC-5000	Sample C	Glycerin	Melting observed	37.9
						C
Viscometer		VS-300	Sample A	Almond Oil	Viscosity stable	7484.64
						cP
Viscometer		VS-300	Sample A	Glycerin	Increased viscosity	7515.09
						cP
V-Vis Spectrophotometer	UV-2600	Sample D	Vitamin E	Absorbance observed	1.8	Abs

Results and Discussion

The series of tests conducted provided comprehensive insights into the physical and chemical properties of the various oil mixtures.

Sample A:

Almond Oil combined with Cetyl Alcohol and Glycerin showed specific interactions as observed in the NMR at 7.9 ppm, indicating characteristic chemical shifts. The viscosity measurements using the Viscometer VS-300 highlighted the influence of Glycerin, demonstrating an increase from 7484.64 cP to 7515.09 cP. The GC-2010 analysis revealed a high concentration of Cetyl Alcohol at 523.4 ppm.

Sample B:

The blend of Jojoba Oil and Glycerin exhibited uniform rheological properties, with a viscosity measurement of 145.6 Pa-s. The Mass Spectrometer further confirmed the major component peak at 800.1 m/z, indicative of Glycerin.

Sample C:

The crystalline structure evaluation via XRD-6000 at 120.3°C confirmed the presence of Beeswax. This composition

demonstrated unique thermal properties as observed with the Thermocycler at 37.9°C.

Sample D:

Coconut Oil combined with Gum and Vitamin E was analyzed using UV-Vis, showing a notable absorbance of 1.8 Abs which correlates to Vitamin E concentration. The HPLC confirmed the presence of 450.2 mg/L of Vitamin E.

Conclusion

The study effectively characterized the chemical and physical properties of different oil mixtures. Notably, the utilization of advanced instrumentation enabled precise quantification and validation of each component's respective influence within the mixtures.

Note: Certain random observations and elements were omitted in this presentation in favor of technical clarity. Further studies might explore additional variables to contrast methods for analyzing sample complexities.

Disclaimer: This report is intended for educational purposes and may include non-essential or random data to challenge automated extraction methods.