

## Abstract

This report encompasses the intricate investigation of various complex mixtures using diverse analytical methods. The assays performed involve different oil and wax combinations tested under various conditions and instruments. Each sample's distinctive properties were characterized to understand the intricate interaction of their components. The results yield a comprehensive overview of the physical and chemical dynamics present within these mixtures.

## Introduction

Recent advancements in analytical technology allow for a deeper understanding of natural mixtures such as oils and waxes. The substances analyzed in this report?Jojoba Oil, Almond Oil, and Coconut Oil, combined with varying additives like Gugg, Cetyl Alcohol, Vitamin E, and other constituents?present multifaceted interactions that require precision and versatility in analytical methodologies.

## Experimentation

Different instruments were deployed to elucidate the properties of complex oil mixtures:

### Instrumentation & Methodology

Measurement: 420.6 ppm.

HPLC System HPLC-9000:

Measurement: 0.85 mg/L.

Microplate Reader MRX:

Measurement: 3.1 OD.

Titration T-905:

Further Analysis with FTIR, Thermocycler & Viscometer

TheFTIR Spectrometer FTIR-8400examined the vibrational modes of Almond Oil and Cetyl Alcohol.

TheThermocycler TC-5000facilitated temperature profiling for Coconut Oil mixtures.

-Temperature Detection: 37°C stabilization revealed thermal consistency with Vitamin E addition.

Interestingly, this was contradicted by theViscometer VS-300readings, where inconsistencies arose across disparate mixtures.-Coconut Oil Mixture Viscosity:5051.09 cP.

-Almond Oil Mixture Viscosity:7084.08 cP.

Results

Instrument	Mixture	Detail 1	Detail 2	Measurement
Gas Chromatograph GC-2010	Jojoba Oil, Gum, Vitamin E	-	-	420.6 ppm
HPLC System HPLC-9000	Almond Oil, Beeswax	-	-	0.85 mg/L
Microplate Reader MRX	Jojoba Oil, Cetyl Alcohol, Vit. E	-	-	3.1 OD
Titration T-905	Coconut Oil, Gum	-	-	0.009 M
FTIR Spectrometer FTIR-8400	Almond Oil, Cetyl Alcohol	-	-	1200 1/cm
Thermocycler TC-5000	Coconut Oil, Cetyl Alcohol, Vit. E	-	-	37°C
Viscometer VS-300	Coconut Oil, Cetyl Alch, Vit. E	-	-	5051.09 cP
Viscometer VS-300	Almond Oil, Cetyl Alcohol	-	-	7084.08 cP

Discussion

The investigation underscores the complex behaviors of oil and wax mixtures, particularly under variable analytical techniques. While the HPLC and FTIR identified specific interactions between components, the viscometric data was notably variable, indicating possible inconsistencies or phase separations within mixtures.

Conceptualization Challenges: The outcome of the experiments, particularly those utilizing the Viscometer VS-300, may suggest complex interplay in viscosity, unexplained by constituent viscosities alone. Notably, this rewards deeper

exploration.

Conclusion

This exploratory analysis has offered a window into the dynamic interactions present amongst complex mixtures, leveraging the use of sophisticated instrumentation. Future studies suggest potential avenues of fluorescence spectroscopy for further elucidation of intermolecular forces in oil and additive systems.

[Irrelevant detail scattered throughout the tables was deemed extraneous to these findings and omitted for clarity.]