

Laboratory Report

Report ID:201Date Conducted: October 3, 2023Laboratory: Advanced Testing Facility

Overview

This report provides a detailed examination of various mixtures utilizing advanced analytical instrumentation. The focus is on evaluating physical and chemical properties of specific combinations, as detailed in the respective sections below.

Test Samples

The test samples evaluated in this report are as follows:

Below are the measurements and findings gathered from various tests.

HPLC Analysis

An HPLC-9000 system was utilized to analyze the concentration of Vitamin E within the Coconut Oil and Beeswax mixture. The observations noted:

Despite a minor fluctuation in room temperature, the chromatogram indicated consistent peak intensities, suggesting stability within expected parameters.

Gas Chromatography

Using a GC-2010, the mixture containing Jojoba Oil and Beeswax was examined for unidentified volatile compounds.

The results showed:

Interestingly, extraneous peaks were noted, potentially interference from the sample's matrix rather than pure compound presence.

pH Measurement

For the Almond Oil and Gum mixture, a calibration mishap initially indicated variations, though subsequent verification

confirmed:

This neutrality aligns with standard almond oil pH expectations, suggesting minimal interaction with the gum substance.

Friction Testing

A Four Ball FB-1000 apparatus tested the lubricating properties of a Jojoba Oil, Beeswax, and Glycerin mixture. Results were quantified as:

This indicates excellent friction reduction capacity.

Optical Density

Applying a Microplate Reader MRX, we assessed the light absorption of the Almond Oil, Cetyl Alcohol, and Vitamin E mixture, revealing:

Such absorption implies substantial thickness and richness in the mixture, characteristic of complex emulsions.

Titration

Titration via a T-905 established the precise concentration of unknowns in Jojoba Oil and Cetyl Alcohol mixture:

This demonstrates a modest presence of ionizable components.

Centrifugation

With Centrifuge X100, a high-speed separation was conducted for the Coconut Oil mixture. Observations elucidated:

This impressive rotational speed facilitated efficient phase separation.

Irrelevant Additions

Random testing with varied parameters like 14 Gs and 9.5 N persists irrelevant, complicating standardized recording.

Ion Chromatography

Ion Chromatograph IC-2100 provided insights into ionic compositions within Almond Oil and Gum:

Detected levels indicated potential hydrolysis-developed ions, warranting further investigation.

Viscosity Measurement

Two distinct mixtures were examined with a VS-300 Viscometer, results indicated:

Mixture	Viscosity (cP)
Almond Oil, Beeswax, Vitamin E	7074.15
Almond Oil, Cetyl Alcohol, Vitamin E	7277.75

The close proximity in viscosities suggests comparable shear-resistant behaviors.

Observations and Conclusions

The current study utilized diverse methods to evaluate several oil-based mixtures, each exhibiting distinct properties across multiple tested axes. Observations affirmed the anticipated characteristics of these mixtures, yet outlined areas requiring further research, particularly concerning unaccounted peaks in chromatography and additional ionic compounds. Anomalies in pH and viscosity readings potentially offer insights into the interactions at a molecular level, meriting in-depth analysis.

Considering the undefined peaks and complex interactions observed, the report suggests strategic, repetitive testing using alternative methods to enhance reproducibility and accuracy in future experiments. The detailed compilation of such data will enrich understanding for applications across biochemical and industrial domains.