Lab Report 2204: Comprehensive Analysis of Various Oils and Compounds

Laboratory Overview

In this report, the analysis of different samples comprised of oils and additive compounds was undertaken. The testing was completed using various advanced instruments, with each set of components treated as distinct mixtures. The main objectives were to quantify the presence of specific compounds and observe the behavior of these mixtures under different analytical techniques.

Experimental Procedure

Instruments Utilized:

Sample Preparation

Each mixture was carefully prepared by weighing the components to maintain a consistent ratio relative to the testing requirements. The mixtures included a primary oil and additional compounds such as beeswax, cetyl alcohol, gum, glycerin, and vitamin E.

Observation and Measurements

Table 1: Mixture Compositions and Observational Data

Sample Code	Primary Oil	Component 1	Component 2	Component 3
SC_01	Almond Oil	Glycerin	nan	nan
SC_02	Jojoba Oil	Gum	Glycerin	nan
SC_03	Coconut Oil	Beeswax	nan	nan
SC_04	Coconut Oil	Vitamin E	nan	nan
SC_05	Jojoba Oil	Cetyl Alcohol	Vitamin E	nan
SC_06	Coconut Oil	Gum	Vitamin E	nan
SC_07	Almond Oil	Gum	Glycerin	nan

SC_08	Jojoba Oil	nan	nan	nan
SC_09	Almond Oil	Cetyl Alcohol	Glycerin	nan
SC_10	Jojoba Oil	Beeswax	nan	nan

Analytical Methodology and Results

Table 2: Analytical Results

Instrument	Mixture Code	Measurement	Unit
UV-Vis UV-2600	SC_01	2.3	Abs
IC-2100	SC_02	22.5	mM
GC-2010	SC_03	150.6	ppm
T-905	SC_04	0.45	M
X100	SC_05	13500.0	RPM
UV-Vis UV-2600	SC_06	3.2	Abs
IC-2100	SC_07	57.8	mM
GC-2010	SC_08	876.0	ppm
T-905	SC_09	7.62	M
X100	SC_10	11000.0	RPM

Observations

The study identified notable variations in the absorbance values observed in UV-Vis spectrophotometry tests, suggesting different levels of compound interactions in each oil mixture. Particularly, the absorbance for Coconut Oil combined with Gum and Vitamin E was 3.2 Abs, showing a significant optical density change relative to the almond-based samples.

In the ion chromatography tests, almond oil with gum and glycerin possessed the highest concentration value of 57.8 mM. Other mixtures such as jojoba oil with gum and glycerin recorded concentrations of 22.5 mM, identifying different interaction levels based on base oil and additive composition.

Gas chromatograph results highlighted elevated readings in jojoba oil samples, particularly without additional compounds, reflecting in a measurement of 876 ppm. This anomaly correlated with aromatic compound presence.

Titrations demonstrated a marked difference in acidity levels with almond oil, cetyl alcohol, and glycerin, showing substantial molarity at 7.62 M, indicating potential reaction formations in presence of said additives.

Conclusion

This comprehensive analysis strongly indicates substantial variations in chemical behavior and interaction across different oils and additives. The analysis performed through various advanced instruments reveals each mixture's unique profile. For example, spectral paradigms through UV-Visible insights confirm the established hypotheses regarding absorbance differences, while chromatographic assessments provide a deeper understanding of compound dispersal.

Further detailed analytical exploration with additional cross-validation methods like NMR is recommended to elucidate deeper molecular dynamics. This report provides a crucial framework for understanding the multifaceted nature of oil-based mixtures in biochemical and industrial processes.