Lab Report 2220: Analysis of Various Oil Mixtures

Introduction:

The primary objective of this study is to assess the conductivity, UV-Vis absorbance, liquid chromatography, ion chromatography, and various other physical properties of diverse oil mixtures. This experiment provides insights into how different substances interact when mixed with natural oils under controlled conditions.

Materials and Methods:

In this study, various oil samples mixed with additives were analyzed using their respective instruments. Each sample is a unique blend, assessed for specific properties:

HPLC: Analyzed using the HPLC System HPLC-9000.

Coconut Oil Mixtures:

Centrifugation: Tested using the Centrifuge X100.

Jojoba Oil Mixtures:

Experimental Observations:

During the analysis, unexpected observations were made, such as fluctuations in ambient temperature due to an errant HVAC system or interference from a neighboring lab's activity. Anecdotally, the almond oil mixture emitted a subtle fragrance when exposed to UV rays, hinting at photolytic degradation, though this was not central to the study.

Results and Discussion:

Table 1: Conductivity and UV-Vis of Almond Oil Mixtures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample Ingredients** | **Instrument** | **Measurement** | **Value** | **Unit** |
| Almond Oil | CM-215 | Conductivity | 200.0 | µS/cm |
| Almond Oil, Cetyl Alcohol, Vitamin E | UV-2600 | Absorbance | 1.5 | Abs |

Within the almond oil mixtures, a conductivity of 200 µS/cm suggests moderate ionic presence, usable for preliminary quality assessments. Absorbance was stable at 1.5 Abs units, indicating the significant presence of Vitamin E due to its absorption spectrum.

Table 2: Chemical Analysis of Coconut Oil Mixtures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample Ingredients** | **Instrument** | **Measurement** | **Value** | **Unit** |
| Coconut Oil | LC-400 | Concentration | 350 | µg/mL |
| Coconut Oil, Beeswax, Glycerin | IC-2100 | Ion Concentration | 5 | mM |
| Coconut Oil | X100 | Centrifugation Speed | 12000 | RPM |

The LC-400 results on coconut oil alone show a significant 350 µg/mL concentration of active constituents. Ion chromatography revealed a surprising 5 mM of ions which may require additional verification with other analytical techniques.

Table 3: Thermal and Viscous Properties of Jojoba and Almond Oil Mixtures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample Ingredients** | **Instrument** | **Parameter** | **Value** | **Unit** |
| Jojoba Oil, Vitamin E | TC-5000 | Temperature | 65.0 | ºC |
| Almond Oil, Beeswax, Glycerin | VS-300 | Viscosity | 7117.92 | cP |
| Jojoba Oil, Gum, Glycerin | VS-300 | Viscosity | 1746.94 | cP |

Jojoba oil solutions stabilized at 65 ºC, optimal for potential enzymatic reactions, indicating its suitability for biotechnological applications. Viscosity measurements reveal significant variance between almond oil blends and jojoba, highlighting differing molecular interactions.

Conclusion:

The varied results underscore the diverse properties inherent in these oil mixtures, which can be tailored for specific industrial applications. Further studies may delve into optimizing conditions for each process step, such as exploring different temperature or pressure settings for better efficiency.

Irrelevant Data Section:

Future Directions:

To enhance the understanding of these mixtures, follow-up experiments should consider varying the concentrations of additives, observing potential changes in physical properties like melting or boiling points.

This comprehensive analysis provides a snapshot of current capabilities, highlighting both the strengths and potential oversights encountered during routine oil mixture evaluations.