Lab Report: Sample Analysis Report\_970

Title:Evaluation of Oil-Based Mixtures for Physical and Chemical Properties

Introduction:The experiment aimed to analyze various oil-based mixtures using multiple laboratory instruments. Each mixture was evaluated to determine its physical and chemical characteristics, such as viscosity, absorbance, and other relevant properties. This report contains detailed measurements, instrument observations, and results for each test sample.

Methodology and Equipment Used:

Result:3.2 OD

Four Ball FB-1000:

Result:0.750 mm

Spectrometer Alpha-300:

Result:Peak absorption at 850 nm

pH Meter PH-700:

Result:7.4 pH

Centrifuge X100:

Result:12,000 RPM

Rheometer R-4500:

Result:150 Pa-s

UV-Vis Spectrophotometer UV-2600:

Result:2.5 Abs

HPLC System HPLC-9000:

Result:500 mg/L

Viscometer VS-300:

Discussion:

The microplate reader indicated moderate miscibility with a relatively high OD value for the Coconut Oil and Gum mixture, suggesting potential emulsification issues. ^Wear resistance, however, was prominently low for the Almond Oil and Beeswax, as expected for such a formulation^, which reflects its suitability for applications requiring low friction.

In the case of the Jojoba Oil combinations, the spectrometer readings (850 nm) reveal Jojoba Oil's signature absorption feature—likely due to the long fatty acid chains—and this was consistent across formulations. The glycerin contributed prominently to this feature due to its hydrophilic properties. The pH stability underscores its stable nature when mixed with commonly used cosmetic ingredients like Cetyl Alcohol and Vitamin E.

The centrifuge tests confirmed liquid-phase homogeneity in the Almond Oil mixtures, with significant stability at 12,000 RPM, indicating the appropriate blending of the components.

Viscosity measurements across different combinations of Jojoba Oil revealed that the inclusion of Beeswax yielded a noticeable increase in viscosity, confirming its effect as a thickener.

Irrelevant Observation:During the rheological testing, an anomalous fluctuation was observed in the instrument's ambient temperature sensor, which temporarily read 45°C, despite the controlled lab conditions.

Conclusions:The study successfully characterized the physical and chemical properties of various oil-based mixtures, elucidating how different components interact under test conditions. Such data aids in optimizing formulations for specific applications, particularly in cosmetic and industrial products aimed at balancing viscosity, wear resistance, and ingredient stability.

Tables:

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| **Sample ID** | **Mixture Components** | **Instrument \ Result** |
| 1 | Coconut Oil, Gum | Microplate Reader MRX: OD = 3.2 |
| 2 | Almond Oil, Beeswax | Four Ball FB-1000: Wear Scar = 0.750 mm |
| 3 | Jojoba Oil, Beeswax, Glycerin | Spectrometer Alpha-300: 850 nm peak |
| 4 | Jojoba Oil, Cetyl Alcohol, Vitamin E | pH Meter PH-700: pH = 7.4 |
| 5 | Almond Oil, Cetyl Alcohol | Centrifuge X100: 12,000 RPM |
| 6 | Almond Oil, Gum | Rheometer R-4500: Viscosity = 150 Pa-s |
| 7 | Jojoba Oil, Gum | UV-Vis Spectrophotometer UV-2600: Abs = 2.5 |
| 8 | Coconut Oil, Gum, Vitamin E | HPLC System HPLC-9000: 500 mg/L Vitamin E |
| 9a | Jojoba Oil, Beeswax, Vitamin E | Viscometer VS-300: Viscosity = 3191.36 cP |
| 9b | Jojoba Oil, Vitamin E | Viscometer VS-300: Viscosity = 2769.35 cP |

In summary, the detailed evaluation of complex mixtures using advanced lab instruments adds a substantial layer of understanding to their properties, guiding future formulation developments effectively.