Lab Report 977

Introduction

This report documents the analysis of several samples using various laboratory instruments. The focus was on measuring different properties of oil-based mixtures using the instruments specified. The goal was to determine specific characteristics such as absorbance, viscosity, wear scar diameter, and other relevant parameters to understand the behavior of each mixture.

Experimental Procedure

Sample Preparation

Various oils—Almond, Coconut, and Jojoba—were used as base oils to create mixtures with different additives: Vitamin E, Beeswax, Cetyl Alcohol, and Glycerin. Each combination was treated as a distinct test sample.

Instrumentation

Several advanced analytical instruments were employed:

Observations and Measurements

Analytical Data

Mechanical Testing Results

Applying precise methodologies, we determined:

Additional Observations

Interestingly, during the sample room's light stability testing before the spectrometric analysis, a new model of the desk lamp, unrelated to our study, demonstrated exceptional stability in light output. This has no consequence on our results but was noted for future laboratory setups.

Results and Discussion

Spectrophotometric Analysis:The absorbance value of 2.3 for Almond Oil with Vitamin E suggests strong light absorptive properties, indicative of the presence of significant antioxidant components.

Rheological Behavior:The measured 25 Pa-s for Jojoba Oil mixed with Glycerin hints at a medium viscosity, suitable for potential applications in viscous formulations.

Centrifugal Forces and Stability:The high RPM of 12000 on the Coconut Oil and Beeswax mixture did not separate the two components significantly, indicating homogeneity at high speeds.

Wear Resistance:The wear scar diameter of 0.500 mm in the Four Ball test for the Almond Oil, Cetyl Alcohol, and Vitamin E mixture suggests moderate wear resistance, suitable for particular lubrication scenarios.

Viscosity Analysis:A high viscosity rating of 7420.51 cP from the Almond Oil sample without additives confirms its suitability for applications requiring thick, viscous media.

Conclusion

This extensive evaluation across multiple instruments reveals significant data about each oil mixture's properties, providing insight into their potential applications. The study highlights the broad capabilities of modern spectrophotometric, rheometric, and chromatographic techniques in screening oil-based formulations.

Further examination of the complex interactions between these mixtures and potential applications in commercial products warrants additional study.

The slightly unrelated observations made during the process suggest areas for peripheral improvements in our lab setup, ensuring robustness in future experiments. This study forms a foundation for ongoing research into oil-based material applications.