Lab Report 49: Rheological and Optical Properties of Various Oil Mixtures

Introduction

The study aimed to analyze the rheological and optical properties of various oil mixtures using different instruments, including the Rheometer R-4500, Microplate Reader MRX, UV-Vis Spectrophotometer UV-2600, Conductivity Meter CM-215, and Viscometer VS-300. Each test sample comprised a unique combination of oils and additives. Observations and results are reported below.

Experimental Methods

Sample Preparation

Mixtures of oils with different additives were prepared. Ingredients per sample included various combinations of Coconut Oil, Almond Oil, Jojoba Oil, and additives like Beeswax, Glycerin, Vitamin E, Cetyl Alcohol, and Gum.

Instrumentation

Observations and Data Collection

Table 1: Rheological Measurements

Sample ID	Instrument	Ingredients (Key Components)	Viscosity/Measurement	Unit
1	Rheometer R-4500	Coconut Oil, Beeswax, Glycerin	10.5	Pa-s
2	Rheometer R-4500	Almond Oil, Beeswax, Glycerin	25.7	Pa-s
3	Rheometer R-4500	Almond Oil, Beeswax, Vitamin E	30.2	Pa-s
4	Rheometer R-4500	Coconut Oil, Cetyl Alcohol	75.8	Pa-s
5	Rheometer R-4500	Coconut Oil, Gum, Vitamin E	95.4	Pa-s

Remarks

Table 2: Optical Measurements

Sample ID	Instrument	Ingredients (Key Components)	Measurement	Unit
6	Microplate Reader MRX	Jojoba Oil, Gum, Vitamin E	3.2	OD
7	Microplate Reader MRX	Coconut Oil, Cetyl Alcohol, Glycerin	2.5	OD
8	UV-Vis Spectrophotometer	Jojoba Oil, Cetyl Alcohol, Vitamin E	1.5	Abs

Remarks

Table 3: Conductivity and Viscometric Measurements

Sample ID	Instrument	Ingredients (Key Components)	Measurement	Unit
9	Conductivity Meter CM-215	Coconut Oil, Gum, Glycerin	450.0	uS/cm
10	Viscometer VS-300	Almond Oil, Beeswax, Glycerin	7084.83	cP
11	Viscometer VS-300	Coconut Oil, Beeswax	4952.85	cP

Remarks

Discussion

The experiments conducted hold significant relevance in cosmetic and food industries, providing insights into how components interact under various conditions. Samples exhibited a wide range of rheological properties, important for texture and stability in formulations. Interestingly, vitamin additives marked higher viscosities, perhaps due to molecular interactions that enhance thickness.

Optical measurements suggested that samples with Vitamin E absorbed more light than those without, indicating potential applications in UV-protective formulations. Conductivity results emphasized the hydrophilic-hydrophobic balance crucial for emulsion systems.

Conclusion

In summary, this report outlines the complex measurements of oil-based formulations using diverse analytical instruments. Variations in viscosity, optical density, and conductivity provide a broader understanding of these mixtures' potential applications in various industries.

(End of Report 49)