Lab Report 1220: Analysis of Oil-Based Mixtures

Introduction

The purpose of this lab report is to document and analyze the properties of various oil-based mixtures using different laboratory instruments. The mixtures are combinations of Almond Oil, Coconut Oil, and Jojoba Oil with additional components such as Beeswax, Gum, Vitamin E, Cetyl Alcohol, and Glycerin. The analyses were carried out using equipment such as a Thermocycler, HPLC system, Rheometer, pH Meter, Ion Chromatograph, and Viscometer. Each combination of ingredients was treated as a single test sample.

Materials and Methods

Ingredients Tested

Instruments Used

Procedure Overview

Each mixture was subjected to a series of tests using the above-listed instruments to determine properties such as viscosity, pH, ion concentration, and physical stability.

Experimental Observations

1. Thermocycler Analysis- Mixture: Almond Oil, Gum, Vitamin E  
- Temperature Range: [4-99]  
- Result: 48

Observation:The thermocycler determined the stability temperature of the Almond Oil mixture to be 48°C. Interestingly, this was consistent across the similar components when Jojoba Oil was used instead.

2. HPLC System Measurements- Mixture: Coconut Oil, Beeswax  
- Concentration Range: [0.01-1000]  
- Retention Time: 250

Observation:The Beeswax component influenced the retention time appreciably, providing insights into the miscibility parameter with Coconut Oil.

3. Rheometer Analysis- Mixture: Jojoba Oil, Gum, Vitamin E  
- Shear Rate Range: [0.1-1000]  
- Viscosity: 500

Observation:The Rheometer's results highlight a significant shear-thinning behavior, indicating potential suitability for cosmetic use.

Results and Discussion

pH Measurement

Discussion:The slightly acidic nature of this mixture suggests compatibility with skin pH. The presence of Glycerin may contribute to stabilized pH levels.

Ion Chromatograph Findings

Discussion:The Ion Chromatograph IC-2100 results show low ionic presence, indicating minimal ion exchange capacity, particularly vital for formulations that require electrical neutrality.

Viscosity Measurements

Table 1: Viscometer Results

|  |  |  |
| --- | --- | --- |
| **Sample ID** | **Mixture** | **Viscosity (cP)** |
| A | Almond Oil, Cetyl Alcohol, Vitamin E | 7281.67 |
| B | Coconut Oil, Vitamin E | 4947.35 |
| C | Almond Oil, Gum, Glycerin | 7849.54 |

Irrelevant Note:The viscosity of Sample B was measured while a background noise of ambient music was present, potentially spiking interest in auditory influences on laboratory results.

Conclusion

The experimental results provide a comprehensive understanding of the physical and chemical properties of various oil-based mixtures. The range of viscosities, pH levels, and ion concentrations helps in determining the potential applications of these mixtures in the cosmetic and pharmaceutical industries. This study emphasized the importance of controlled parameters, such as temperature and shear rates, highlighting their pivotal roles in the efficacy of these formulations.

Acknowledgment:Special thanks to the lab assistants for preparing the samples and conducting the preliminary tests.

References:Further literature on viscosity measurements in oil-based mixtures... [data not included for simplicity].