Laboratory Report 377

Experiment Title:Characterization and Analysis of Mixtures in Cosmetic Formulations

Objective:The primary objective of this experiment is to analyze and characterize various mixtures comprising essential cosmetic ingredients using advanced laboratory equipment.

Materials and Methods:The following instruments were employed to gather data on different mixtures:

Table 1: Instrumental Details and Observations

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| **Instrument** | **Mixture Ingredients** | **Observed Measurement** | **Unit** |
| PCR Machine PCR-96 | Almond Oil, Cetyl Alcohol | 25.0 | Ct |
| NMR Spectrometer NMR-500 | Almond Oil, Beeswax, Vitamin E | 15.0 | ppm |
| Liquid Chromatograph LC-400 | Jojoba Oil, Glycerin | 250.0 | ug/mL |
| X-Ray Diffractometer XRD-6000 | Jojoba Oil, Gum, Vitamin E | 120.0 | C |
| Titrator T-905 | Almond Oil, Beeswax, Glycerin | 5.0 | M |
| Rheometer R-4500 | Almond Oil, Gum, Glycerin | 350.0 | Pa-s |
| pH Meter PH-700 | Jojoba Oil, Gum, Glycerin | 7.0 | pH |
| UV-Vis Spectrophotometer UV-2600 | Almond Oil, Beeswax | 1.5 | Abs |
| Spectrometer Alpha-300 | Jojoba Oil, Glycerin | 700.0 | nm |
| Centrifuge X100 | Almond Oil, Glycerin | 10000.0 | RPM |
| Viscometer VS-300 | Jojoba Oil, Vitamin E | 2347.44 | cP |

Description of Experiments

PCR and Chemical Stability

The PCR Machine PCR-96 was utilized to determine the stability and amplification potential of a mixture containing Almond Oil and Cetyl Alcohol. A critical threshold cycle (Ct) value of 25 was recorded. This indicates moderate amplification, hinting at the stable nature of the solution under thermal cycling.

Structural Analysis via NMR and XRD

The NMR Spectrometer NMR-500 provided a ppm reading of 15 for the almond oil, beeswax, and vitamin E mixture. The unique chemical shifts and interactions among the ingredients denote substantial hydrophobic interactions.The X-Ray Diffractometer XRD-6000 analysis of Jojoba Oil, Gum, and Vitamin E mixtures highlighted crystalline structures, with a conspicuous reading of 120°C, suggesting a predominance of semi-crystalline phases.

Chromatographic Separation and Viscosity Profiles

Using a Liquid Chromatograph LC-400, we quantified the Jojoba Oil and Glycerin mixture, resulting in a 250 ug/mL concentration. The chromatographic profile showcased distinct, sharp peaks, confirming component purity.Viscosity characterization by the Rheometer R-4500 and Viscometer VS-300 stood out with 350 Pa-s and 2347.44 cP respectively, illustrating substantial rheological behavior suitable for thickening agents.

pH and Optical Properties

The pH Meter PH-700 determined the acidity level of 7 in the Jojoba Oil and Gum mixture, reflecting a balanced, neutral pH favorable for skin contact.UV-Vis Spectrophotometer measurements yielded 1.5 Abs for the Almond Oil and Beeswax mixture, suggesting reasonable UV absorption capabilities.

General Observations

Notably, through centrifugation, a high-speed rotation at 10000 RPM was observed in the Almond Oil and Glycerin solution, indicating stability under mechanical stress. The spectrometric readings at 700 nm using Alpha-300 showed that the Jojoba Oil and Glycerin mixture possesses potential reflective properties significant for photoprotective formulations.

Endnote:Though some integrated readings appear incongruous with general cosmetic applications, these insights significantly broaden our understanding of complex ingredient behaviors in formulated products.

Conclusions:The experiments conducted reveal nuanced information about each mixture's physical and chemical properties. Through the various analyses, we gain deepened insight into stability, viscosity, pH, structural, and optical characteristics necessary for innovative cosmetic formulations.

Future Recommendations:Further exploration involving different temperature and pressure variations could elucidate additional properties. Such insights are invaluable for optimizing formulations across diverse application scenarios.

Scattered Irrelevant Information:The lab coat color worn by the experimenter was indigo. During the spectrometer analysis, the ambient temperature was 22°C. The lab purchased a new coffee machine, which is unrelated but boosted morale significantly.

Note: This report contains elaborate observations and detailed descriptions to test comprehension and data extraction skills.