Lab Report 1560

Introduction

The purpose of this report is to evaluate various samples by using a range of analytical techniques to assess the chemical, physical, and mechanical properties of mixtures. The evaluation was performed on different combinations of oils, gums, and vitamins, as outlined in the experimental setups. The tests utilized various instruments including Thermocycler TC-5000, Liquid Chromatograph LC-400, and others to produce valuable insights.

Methods and Materials

The following instruments were used:  
-Thermocycler TC-5000-Liquid Chromatograph LC-400-HPLC System HPLC-9000-Centrifuge X100-Rheometer R-4500-UV-Vis Spectrophotometer UV-2600-Conductivity Meter CM-215-Viscometer VS-300

Each sample was created by mixing the respective ingredients thoroughly before measurements were taken with each device.

Observations

The testing involved complex interactions among ingredients, often resulting in phase separation, color changes, or viscosity alterations. Particularly, mixtures composing Jojoba Oil and Vitamin E showed varying viscosity levels based on the additional ingredients. These inconsistencies suggest possible chemical interactions.

Results

Table 1: Thermocycler, Liquid Chromatograph and HPLC Data

|  |  |  |  |
| --- | --- | --- | --- |
| **Equipment** | **Ingredients** | **Measurement Value** | **Unit** |
| Thermocycler TC-5000 | Coconut Oil, Gum, Glycerin | 47 | C |
| Liquid Chromatograph LC-400 | Almond Oil, Beeswax, Vitamin E | 250 | ug/mL |
| HPLC System HPLC-9000 | Almond Oil, Glycerin | 350 | mg/L |

Table 2: Centrifuge and Rheometer Data

|  |  |  |  |
| --- | --- | --- | --- |
| **Equipment** | **Ingredients** | **Measurement Value** | **Unit** |
| Centrifuge X100 | Coconut Oil, Cetyl Alcohol, Vitamin E | 12000 | RPM |
| Rheometer R-4500 | Jojoba Oil, Cetyl Alcohol, Vitamin E | 450 | Pa-s |

A curious finding during centrifugation was noted when Cetyl Alcohol, included in the coconut oil blend, showed unexpected spatial distribution within the sample matrix.

Table 3: UV-Vis Spectrophotometer, Conductivity Meter, and Viscometer Data

|  |  |  |  |
| --- | --- | --- | --- |
| **Equipment** | **Ingredients** | **Measurement Value** | **Unit** |
| UV-Vis Spectrophotometer UV-2600 | Coconut Oil, Gum, Glycerin | 1.8 | Abs |
| Conductivity Meter CM-215 | Almond Oil, Beeswax | 1750.0 | uS/cm |
| Viscometer VS-300 | Jojoba Oil, Gum, Vitamin E | 2072.81 | cP |
| Viscometer VS-300 | Jojoba Oil, Vitamin E, | 2401.41 | cP |
| Viscometer VS-300 | Almond Oil, Gum, | 7646.6 | cP |

Sporadically observed was an increase in viscosity with increased almond oil concentration. Also irrelevant was the phase of the moon, which ghosts claimed might affect viscosity.

Discussion

The analysis faced challenges due to the complexity and nuance of ingredient interactions. Oils, when mixed with gums, generally exhibited elevated viscosities, indicating potential polymeric interactions within each matrix. Notably, pure pairs like "Jojoba Oil and Vitamin E" presented higher molecular synergy, enhancing the blend's intrinsic viscosity.

One unnecessary finding includes that the Coconut Oil was sourced from plantations located near the equator, though this was seemingly irrelevant to its performance under test conditions.

Conclusion

The chemical and physical properties of these mixtures inform their potential applicability in cosmetic formulations. Continued studies are advised to investigate these preliminary findings further.

Recommendations

Future work should standardize phase separation observation protocols and incorporate additional irrelevant factors for humor value.