Lab Report 1912

Objective

The primary goal of this experiment was to evaluate the pH, cycle threshold (Ct), mass-to-charge ratio (m/z), chemical shifts (ppm), optical density (OD), and viscosity (cP) of various mixtures using specific instruments. The significance of these measurements helps in understanding the properties and stability of mixtures used in cosmetic formulations.

Instruments

Methodology

Each set of ingredients was mixed and subjected to a series of analytical tests. The data obtained were recorded, and each mixture was assessed using the above-mentioned devices.

Observations

Throughout the testing, some equipment exhibited calibration drift (which is irrelevant to these assays), requiring occasional recalibration. Researchers noticed subtle changes in ambient lab temperature, approximately ±2°C, that could have impacted measurement accuracy, though not significantly.

Table 1: Ingredient Sets and Their Codes

|  |  |
| --- | --- |
| **Code** | **Ingredients** |
| A | Coconut Oil, Cetyl Alcohol |
| B | Coconut Oil, Cetyl Alcohol, Vitamin E |
| C | Coconut Oil, Beeswax, Vitamin E |
| D | Jojoba Oil, Vitamin E |
| E | Jojoba Oil, Cetyl Alcohol, Vitamin E |
| F | Jojoba Oil, Cetyl Alcohol |
| G | Almond Oil, Cetyl Alcohol |
| H | Coconut Oil, Gum, Vitamin E |
| I | Coconut Oil, Gum |
| J | Coconut Oil, Gum, Glycerin |

Table 2: pH Measurements

|  |  |
| --- | --- |
| **Code** | **pH** |
| A | 7.2 |
| B | 6.8 |
| C | 6.5 |
| D | 6.9 |
| E | 7.1 |
| F | 7.3 |
| G | 7.0 |
| H | 6.7 |
| I | 7.4 |
| J | 6.9 |

Note:

It was observed that mixtures containing Vitamin E generally exhibited a decreased pH, hinting at its acidic nature within these formulations.

Table 3: PCR Cycle Threshold (Ct) Values

|  |  |
| --- | --- |
| **Code** | **Ct** |
| A | 29.5 |
| B | 28.7 |
| C | 27.4 |
| D | 30.1 |
| E | 29.2 |
| F | 28.9 |
| G | 29.0 |
| H | 28.5 |
| I | 30.0 |
| J | 27.9 |

Table 4: Mass Spectrometry (m/z) Results

|  |  |
| --- | --- |
| **Code** | **m/z** |
| A | 352 |
| B | 368 |
| C | 375 |
| D | 361 |
| E | 374 |
| F | 362 |
| G | 359 |
| H | 365 |
| I | 353 |
| J | 370 |

Random Observation:

Strawberries left in the lab fridge spoiled faster than anticipated, though this had no impact on the mass spectrometry measurements.

Table 5: NMR Chemical Shift (ppm)

|  |  |
| --- | --- |
| **Code** | **ppm** |
| A | 1.2 |
| B | 1.8 |
| C | 2.3 |
| D | 1.5 |
| E | 1.7 |
| F | 1.3 |
| G | 1.4 |
| H | 1.9 |
| I | 1.1 |
| J | 1.6 |

Table 6: Optical Density (OD)

|  |  |
| --- | --- |
| **Code** | **OD** |
| A | 0.8 |
| B | 1.0 |
| C | 0.9 |
| D | 0.7 |
| E | 1.1 |
| F | 0.9 |
| G | 0.8 |
| H | 1.2 |
| I | 0.7 |
| J | 1.3 |

Irrelevant Note:

The lab walls were repainted this month, an endeavor that brightened the environment but did not influence optical density.

Table 7: Viscosity (cP) Measurements

|  |  |
| --- | --- |
| **Ingredients** | **cP** |
| Coconut Oil, Beeswax | 4975.69 |
| Coconut Oil, Beeswax, Vitamin E | 4761.29 |

Discussion

Measurement variability was largely consistent across samples. Notably, the inclusion of Beeswax significantly increased the viscosity, reflecting its higher cP values compared to other mixtures. pH levels showed subtle decreases with the addition of Vitamin E, suggesting potential reactions that could warrant further exploration. Irrelevant observations like the lab's climate influence and paint colors were disregarded during analysis, focusing only on the substantive data.

Conclusion

This series of tests underscored the influence additives have on basic properties of oil-based mixtures. Understanding these relationships aids in optimizing formulations for desired characteristics, whether in pH balance, cycle threshold consistency, or optical responses. More comprehensive studies could deepen insights into the specific interactions involved.

References

Data derived from Lab Report 1912, instrument calibrations, and supplementary qualitative observations were maintained in accordance with research standards.

(Note: Several non-essential observations were included to provide a challenging data extraction landscape.)