Lab Report: Investigation of Ingredient Mixtures

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Introduction:

This experiment aims to analyze and characterize various mixtures of ingredients using multiple instruments and methods. By employing techniques such as High-Performance Liquid Chromatography (HPLC), UV-Vis Spectrophotometry, Nuclear Magnetic Resonance (NMR), Ion Chromatography, and others, we assess physical properties and chemical compositions of several related ingredients used commonly in cosmetic and pharmaceutical formulations. Our focus includes ingredients such as Almond Oil, Jojoba Oil, Cetyl Alcohol, and Beeswax.

Test Summary:

Tested mixtures:

While conducting these tests, special attention was given to how the additives such as Vitamin E and Glycerin influence the overall properties of the mixtures, providing insightful correlations to their applications.

Experimental Observations:

Upon testing the combinations listed in the dataset, various observations were made:

While some tests provided straightforward results, such as UV and HPLC, other analysis like NMR required careful calibration of devices due to the complex nature of the mixtures involved.

Results and Discussions:

The results from the instruments are listed below. Each table is followed by elaborate discussions around the nature of the measurements obtained.

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| --- | --- | --- | --- | --- |
| **Test Method** | **Mixture** | **Measured Property** | **Value** | **Units** |
| HPLC System HPLC-9000 | Almond Oil, Cetyl Alcohol, Glycerin | Concentration | 523.47 | mg/L |
| UV-Vis Spectrophotometer | Jojoba Oil, Cetyl Alcohol, Vitamin E | Absorbance | 1.75 | Abs |
| Conductivity Meter | Almond Oil, Beeswax | Conductivity | 1852.0 | uS/cm |

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| --- | --- | --- | --- | --- |
| **Test Method** | **Mixture** | **Measured Property** | **Value** | **Units** |
| NMR Spectrometer | Coconut Oil, Gum | Chemical Shift | 15.6 | ppm |
| Ion Chromatograph | Coconut Oil, Beeswax | Concentration | 42.3 | mM |
| pH Meter | Jojoba Oil, Gum | pH | 6.3 | pH |

Finally, viscosity measurements using a Viscometer shed light on how different components influence consistency within the formulations.

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| **Test Method** | **Mixture** | **Measured Property** | **Value** | **Units** |
| Viscometer VS-300 | Almond Oil, Cetyl Alcohol, Vitamin E | Viscosity | 7147.0 | cP |
| Viscometer VS-300 | Almond Oil, Gum, Vitamin E | Viscosity | 7478.94 | cP |

Conclusion:

The tests conducted provide valuable insights into how these mixtures might perform in real-world applications. Instruments such as HPLC and UV-Vis highlight chemical interactions, while conductivity, pH, and viscosity measurements are crucial for understanding the formulation well beyond basic chemical make-up. This comprehensive approach aids in designing products tailored for specific needs, reaffirming the utility of these analyses in product development cycles.

Given the data intricacies, it is clear that each combination brings forward unique advantages, positioning these ingredient mixtures as potential key components in cosmetic and pharmaceutical industries.