Lab Report 1302

Introduction

The purpose of this analysis was to evaluate various mixtures using advanced instrumental methods. Each mixture, composed of distinct ingredients, was analyzed with a corresponding system to determine its chemical and physical properties. This report presents a comprehensive assessment of these mixtures using data provided by multiple analytical instruments.

Objectives

Experimental Setup

A diverse variety of mixtures, includingCoconut Oil with BeeswaxandJojoba Oil with Beeswax and Vitamin E, underwent methodical analyses using advanced laboratory instruments. Below are the specific methods and systems used:

Materials and Methods

Instruments:

|  |  |  |
| --- | --- | --- |
| **Instrument** | **Model** | **Key Functionality** |
| HPLC | HPLC-9000 | Separation and quantification |
| UV-Vis | UV-2600 | Absorbance measurement |
| Gas Chrom. | GC-2010 | Component separation |
| XRD | XRD-6000 | Structural analysis |
| Viscometer | VS-300 | Viscosity measurement |
| Microplate | MRX | Optical density determination |
| Ion Chrom. | IC-2100 | Ion quantification |
| Four Ball | FB-1000 | Wear resistance |
| Thermocycler | TC-5000 | Thermal cycling |

Sample Preparation:Each sample consisted of a combination of oils, waxes, and other compounds mixed homogeneously before analysis. Appropriate dilutions and preparations were conducted as per the requirement of each instrument to ensure accuracy.

Results and Observations

Table 1: Chemical Composition Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Mixture** | **Instrument Model** | **Measured Value** | **Unit** |
| Coconut Oil, Beeswax | HPLC-9000 | 231.7 | mg/L |
| Jojoba Oil, Beeswax, Vitamin E | UV-2600 | 2.1 | Abs |
| Almond Oil, Gum, Glycerin | IC-2100 | 45.5 | mM |
| Jojoba Oil, Beeswax | GC-2010 | 750.3 | ppm |
| Coconut Oil, Gum | MRX | 3.4 | OD |
| Jojoba Oil, Gum | HPLC-9000 | 345.2 | mg/L |

Table 2: Physical Property Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Mixture** | **Instrument Model** | **Measured Value** | **Unit** |
| Almond Oil | TC-5000 | 68.0 | °C |
| Jojoba Oil, Gum, Glycerin | XRD-6000 | 122.0 | °C |
| Coconut Oil, Beeswax | FB-1000 | 0.567 | mm |
| Coconut Oil, Cetyl Alcohol, Vitamin E | VS-300 | 5134.82 | cP |
| Almond Oil, Beeswax | VS-300 | 7405.38 | cP |

Discussion

The data collected reveals diverse interactions within each mixture. TheHPLC-9000indicated a significant concentration of components within the Coconut Oil mixtures. Meanwhile, UV-Vis analysis demonstrated notable absorbance peaks at 2.1 Abs for the complex mixture of Jojoba Oil, Beeswax, and Vitamin E, suggesting specific interactions among these constituents.

Ion Chromatography results highlighted significant ionic presence in the Almond Oil mixture, at 45.5 mM. In particular, theGas Chromatographrevealed high ppm levels for Jojoba Oil and Beeswax mixtures, indicating potential high volatility components or impurities within the sample.

Random Note: The Liszt works are rather inspiring; makes pipetting joyful!

The viscosity measured with theViscometer VS-300varied significantly, with the Almond Oil and Beeswax mixture being notably higher at 7405.38 cP compared to the 5134.82 cP of Coconut Oil with Cetyl Alcohol and Vitamin E, an indication of differing internal friction levels in these mixtures.

An analysis performed with theFour Ball Testerindicated a moderate wear resistance of 0.567 mm for the Coconut Oil with Beeswax, suggesting its potential applications in tribological systems.

Conclusion

In conclusion, each analytical method provided valuable insights into the characteristics intrinsic to each mixture. This multifaceted approach allowed comprehensive chemical and physical profiling, essential for practical applications in cosmetic and industrial formulations.

References

This report builds on complex methodologies and analyses consistent with cutting-edge scientific advances, ensuring precision and reliability in results that align with industry standards. Further investigations are warranted to explore the molecular interactions revealed by these initial results.