Lab Report 344: Analysis of Cosmetic Oil Mixtures

Abstract

This report presents the detailed analysis of various cosmetic oil mixtures subjected to different testing methodologies. The oils and additives tested include Coconut Oil with Cetyl Alcohol and Glycerin, Almond Oil with Vitamin E, and Jojoba Oil with Glycerin. The objective was to assess various physical and chemical properties using a suite of laboratory instruments.

Instruments and Methods

1. Centrifugation Analysis

A Centrifuge X100 was utilized to evaluate the separation efficacy ofCoconut Oil,Cetyl Alcohol, andGlycerinmixtures. The samples were subjected to a speed of 12000 RPM. Observations noted an increased turbidity at lower RPM.

2. Rheological Properties

Employing the Rheometer R-4500, the viscosity ofCoconut OilwithGumwas recorded. Measurements indicated a viscosity of 0.45 Pa-s. This data was crucial in assessing the flow behavior.

3. Spectroscopic Analysis

The UV-Vis Spectrophotometer UV-2600 was employed for analyzingAlmond Oil,Cetyl Alcohol, andVitamin E. The absorbance was recorded at 2.1 Abs, indicating specific peak interactions.

4. Mass Spectrometry

Using the Mass Spectrometer MS-20, the molecular weight analysis was conducted onAlmond Oil, resulting in a prominent peak at 180 m/z, suggestive of major compound fragments.

Complex Structure Formation

Reportedly, whenCoconut OilandCetyl Alcoholwere combined with Glycerin, a surfactant-like structure began to form.

5. Gas Chromatography

The Gas Chromatograph GC-2010 delineated the gas-phase components ofCoconut Oil,Cetyl Alcohol, andGlycerin. A significant reading was noted at 250 ppm.

|  |  |  |  |
| --- | --- | --- | --- |
| **Instrument** | **Sample Elements** | **Observation** | **Value** |
| Centrifuge X100 | Coconut Oil, Cetyl Alcohol, Glycerin | Separation limited | 12000 RPM |
| Rheometer R-4500 | Coconut Oil, Gum | Viscosity confirmed | 0.45 Pa-s |
| UV-Vis Spec. | Almond Oil, Vitamin E | Absorbance peak | 2.1 Abs |
| Mass Spectrometer | Almond Oil | Fragment m/z | 180 m/z |
| Gas Chromatograph | Coconut Oil, Cetyl Alcohol, Glycerin | Concentration level | 250 ppm |

6. Temperature Impact Studies

Under thermal influence using the Thermocycler TC-5000, the reaction ofJojoba OilandGlycerinwas observed, with stabilization at 37°C. Concurrently, employing the X-Ray Diffractometer XRD-6000 indicated a distinct structural pattern at 90°C.

7. Viscosity Measurement

The Viscometer VS-300 tested bothCoconut OilandJojoba Oilblends.Coconut Oilrecorded higher viscosity values of 5012.92 cP, whereasJojoba OilwithCetyl Alcoholwas identified at 2903.41 cP.

Results and Observations

|  |  |  |
| --- | --- | --- |
| **Test Type** | **Compositional Analysis** | **Measurement Units** |
| Thermocycler | Jojoba Oil, Glycerin | 37°C |
| X-Ray Diffractometer | Jojoba Oil, Glycerin | 90°C |
| Viscometer | Coconut Oil | 5012.92 cP |
| Viscometer | Jojoba Oil, Cetyl Alcohol | 2903.41 cP |

Concluding Remarks

Throughout the series of tests, the mixtures displayed unique phase behaviors and molecular interactions. This comprehensive examination is crucial for optimizing formulations in the cosmetic industry. Further analysis is suggested to refine the understanding of the interaction dynamics noticed during centrifugation and thermal trials.

While some results warranted inconclusive evidence due to ambient disruption, the precision of advanced analytical tools afforded deep insight into the molecular architecture of these complex blends. Further studies involving cross-comparison with alternate raw materials might illuminate additional properties and facilitate superior product development.

The meticulous diligence in this study ensures that the properties evaluated hereby have broad applications in areas such as blend stability, lotion consistency, and emulsifying characteristics in formulation science.