Lab Report 911

Date:October 5, 2023Objective:To analyze various mixtures with specified instrumentation and report their properties and behaviors.

Introduction:

In this study, we utilize a variety of advanced analytical techniques to examine the properties of different oil-based mixtures in a simulated cosmetic formulation context. This includes almond, coconut, and jojoba oils combined with various solid components such as beeswax, cetyl alcohol, gum, and vitamin E. The results give insights into their chemical composition, physical properties, and other relevant parameters.

Methods and Materials:

Several sophisticated instruments were used, including Mass Spectrometer MS-20, Four Ball FB-1000, and others. Ingredients were combined into listed test samples.

Instruments and Test Samples:

Instrument	Sample Composition
Mass Spectrometer MS-20	Almond Oil, Beeswax
Four Ball FB-1000	Coconut Oil, Gum, Glycerin
Spectrometer Alpha-300	Jojoba Oil, Cetyl Alcohol, Vitamin E
FTIR Spectrometer FTIR-8400	Jojoba Oil, Beeswax, Glycerin
UV-Vis Spectrophotometer UV-2600	Jojoba Oil, Gum, Vitamin E
Conductivity Meter CM-215	Coconut Oil, Beeswax, Glycerin
X-Ray Diffractometer XRD-6000	Almond Oil, Vitamin E
HPLC System HPLC-9000	Coconut Oil, Gum
Rheometer R-4500	Jojoba Oil, Beeswax, Glycerin
NMR Spectrometer NMR-500	Jojoba Oil, Gum, Vitamin E

Viscometer VS-300	Jojoba Oil, Vitamin E

Observations and Data:

Sample Results:

Almond Oil & Beeswax (Mass Spectrometer MS-20):

m/z Rating:695

Observations: High mass-to-charge ratio indicative of complex organic compounds present in the oil-wax mixture.

Coconut Oil, Gum, Glycerin (Four Ball FB-1000):

Wear Scar Diameter:0.450 mm

Observations: Low wear, excellent lubricating property.

Jojoba Oil, Cetyl Alcohol, Vitamin E (Spectrometer Alpha-300):

Absorption Peak:245 nm

Observations: Strong absorption in UV range, likely indicative of successful interaction between components.

Jojoba Oil, Beeswax, Glycerin (FTIR Spectrometer FTIR-8400):

FTIR Peak:1800 1/cm

Observations: Typical carbonyl stretching bands revealing presence of esters.

Jojoba Oil, Gum, Vitamin E (UV-Vis Spectrophotometer UV-2600):

Absorbance:2.2 Abs

Observations: High absorbance likely from light scattering properties of suspended particles.

Coconut Oil, Beeswax, Glycerin (Conductivity Meter CM-215):

Conductivity:1020 uS/cm

Observations: Moderate conductivity supports ionic compound presence.

Almond Oil, Vitamin E (X-Ray Diffractometer XRD-6000):

Melting Point:78°C

Observations: Sharp melting point indicative of homogeneity in the crystalline structure.

Coconut Oil, Gum (HPLC System HPLC-9000):

Concentration:500 mg/L

Observations: Consistent with expected concentration for medium-chain triglycerides.

Jojoba Oil, Beeswax, Glycerin (Rheometer R-4500):

Viscosity:420 Pa-s

Observations: Reflective of stable, shear-thickening fluid properties.

Jojoba Oil, Gum, Vitamin E (NMR Spectrometer NMR-500):

Chemical Shift:10.5 ppm

Observations: Downfield shift from Vitamin E indicating proton exchanges.

Jojoba Oil, Vitamin E (Viscometer VS-300):

Viscosity:2645.63 cP

Irrelevant Information:

Discussion:

The comprehensive analysis and characterization of each mixture utilizing distinct analytical instruments revealed a variety of unique properties inherent in the test samples. The FTIR and NMR analyses particularly brought out the structural complexities present in natural oils and waxes when combined with additional components such as cetyl alcohol or vitamin E. The wear and viscosity properties align with hypothesized interactions between these naturally occurring substances, offering a functional perspective applicable in industrial cosmetic developments.

Conclusion:

The results obtained reveal significant information regarding the structural and physical properties of the various oil-based mixtures, which are crucial for developing tailored formulations with desired characteristics in personal care products.