Laboratory Report

Report Number: 288

Objective

The objective of this experiment was to analyze various mixtures containing oils, alcohols, waxes, and glycerin using multiple analytical techniques to measure their properties. The mixtures tested were designed to simulate potential cosmetic formulations.

Materials and Methods

We employed multiple instruments for the tests, encompassing a range of measurements such as concentration, pH, absorption, and viscosity. The equipment used includes:

Each mixture comprised a unique combination of ingredients. Below, we describe the methods and observations in detail.

Experimental Details and Observations

Gas Chromatography Analysis

Sample Composition: Jojoba Oil, Gum, Glycerin-GC-2010detected components with a concentration of525 ppm.  
- Observations indicated a stable mixture with no phase separation during analysis.

Sample Composition: Almond Oil, Beeswax-GC-2010revealed a concentration of875 ppm.  
- Mixture maintained homogeneity post-analysis, confirming consistent dispersibility.

Titration Analysis

Sample Composition: Coconut Oil, Beeswax, Glycerin-Titrator T-905measured molarity at0.35 M.  
- The solution showed complete dissolution of beeswax under test conditions.

Sample Composition: Jojoba Oil, Beeswax, Vitamin E- Titration resulted in a concentration of0.005 M.  
- Microscopic observation suggested a uniform Vitamin E distribution within the mix.

pH Measurement

Sample Composition: Jojoba Oil, Beeswax, Glycerin-pH Meter PH-700registered a value of7.2 pH.  
- Solution exhibited neutral pH, advantageous for topical use.

Sample Composition: Jojoba Oil, Gum- Measured pH recorded at5.5 pH.  
- Gum addition lowered overall pH, enhancing potential skin barrier function.

FTIR Spectroscopy

Sample Composition: Coconut Oil, Cetyl Alcohol- FTIR spectrum displayed a critical absorption peak at2850 1/cm.  
- The peak suggested structured molecular interactions between components.

Sample Composition: Jojoba Oil, Cetyl Alcohol- Identified absorption peak at1650 1/cm.  
- Analysis indicated incomplete hydrogen bonding, presenting opportunities for further modification.

Mass Spectrometric Analysis

Sample Composition: Almond Oil, Glycerin- Mass spectrometer identified mass-to-charge (m/z) ratio of1125 m/z.  
- Fragmentation patterns indicated unique molecular traces correlating with almond-specific lipids.

Viscosity Measurement

Sample Composition: Almond Oil, Beeswax, Glycerin-Viscometer VS-300noted a viscosity of7299.1 cP.  
- The high viscosity makes this blend suitable for emollient applications.

Sample Composition: Coconut Oil, Cetyl Alcohol, Glycerin- Viscosity measured at5175.15 cP.  
- Mixture exhibited shear-thinning properties, vital for ease of application.

Results Overview and Interpretation

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| **Instrument** | **Sample Components** | **Measurement Type** | **Result** |
| GC-2010 | Jojoba Oil, Gum, Glycerin | Concentration | 525 ppm |
| GC-2010 | Almond Oil, Beeswax | Concentration | 875 ppm |
| T-905 | Coconut Oil, Beeswax, Glycerin | Molarity | 0.35 M |
| T-905 | Jojoba Oil, Beeswax, Vitamin E | Molarity | 0.005 M |
| PH-700 | Jojoba Oil, Beeswax, Glycerin | pH | 7.2 pH |
| PH-700 | Jojoba Oil, Gum | pH | 5.5 pH |
| FTIR-8400 | Coconut Oil, Cetyl Alcohol | Absorption peak | 2850 1/cm |
| FTIR-8400 | Jojoba Oil, Cetyl Alcohol | Absorption peak | 1650 1/cm |
| MS-20 | Almond Oil, Glycerin | Mass/Charge (m/z) | 1125 m/z |
| VS-300 | Almond Oil, Beeswax, Glycerin | Viscosity | 7299.1 cP |
| VS-300 | Coconut Oil, Cetyl Alcohol, Glycerin | Viscosity | 5175.15 cP |

The analyses provided insights into the stability, structural chemistry, and application potential of each mixture. Discrepancies such as the unique 1125 m/z value showcase the complexity of almond oil’s molecular composition.

The report's scattered irrelevant details and complex descriptions further emphasize the diverse range of instrument capabilities, adorned with subtle observations about material behavior. These findings could propel future developments aiming to refine cosmetic formulations for improved efficacy and user experience.