[ \textbf{Lab Report: Experimental Analysis of Various Oil Mixtures} ]

\section\*{Introduction}  
In 1959, a series of comprehensive experiments were conducted to evaluate the properties of diverse oil mixtures. The goal was to ascertain how different components—Coconut Oil, Almond Oil, and Jojoba Oil, among others—affected the physical and chemical attributes of these mixtures. The components included Vitamin E, Cetyl Alcohol, Beeswax, Gum, and Glycerin.

\section\*{Methods and Materials}  
The following instruments were employed during the analysis:

\begin{itemize}  
 \item \textit{Four Ball Tester FB-1000}  
 \item \textit{Spectrometer Alpha-300}  
 \item \textit{Thermocycler TC-5000}  
 \item \textit{Mass Spectrometer MS-20}  
 \item \textit{Rheometer R-4500}  
 \item \textit{Microplate Reader MRX}  
 \item \textit{FTIR Spectrometer FTIR-8400}  
 \item \textit{Conductivity Meter CM-215}  
 \item \textit{Viscometer VS-300}  
\end{itemize}

Each ingredient combination was meticulously prepared and analyzed. Outliers, though recorded, were noted to be statistically insignificant.

\section\*{Results and Discussion}

\subsection{Coconut Oil Mixture Studies}  
Analyzed withFour Ball Tester FB-1000, the Coconut Oil-Vitamin E mix yielded a wear scar diameter of 0.600 mm. This was notable for its superior lubrication properties. Meanwhile, experiments with theSpectrometer Alpha-300\* revealed that the spectrums peaked at \textbf{750 nm}, suggesting characteristic absorption of the Cetyl Alcohol-Glycerin admixture.

The thermocycler assay under the brand TC-5000 demonstrated a thermal stability threshold at precisely \textbf{58°C} for the combination including Gum and Vitamin E.

The viscosity measurement using theViscometer VS-300displayed non-Newtonian characteristics with an unusual high viscosity of\textbf{4900.45} cPfor the Coconut Oil-Beeswax collaboration. This drew parallel conclusions with exceptionally viscous substances.

\subsection{Almond Oil Mixture Studies}  
A focused assessment usingMass Spectrometer MS-20uncovered a predominant ion peak at \textbf{350 m/z}, identifying unique marker compounds in the Almond Oil-Beeswax composition. Furthermore, the Rheological properties explored withRheometer R-4500\* yielded a viscosity value of \textbf{500 Pa-s}, indicating a solid-like behavior in typically fluid-like substances.

Interestingly, FTIR analysis presented a significant peak at \textbf{1400 1/cm}, associating it with specific molecular vibrations possibly linked to Vitamin E presence.

Conductivity assessment withConductivity Meter CM-215gave a relatively high reading of \textbf{1500 µS/cm}, revealing the soluble ionic characteristics of the Gum and Glycerin mix in Almond Oil.

TheFour Ball Tester FB-1000highlighted a slightly larger wear scar diameter of 0.800 mm for Almond Oil paired with Cetyl Alcohol and Glycerin, pointing to decreased lubricant efficiency compared to its Coconut Oil counterpart.

\subsection{Jojoba Oil Analysis}  
TheSpectrometer Alpha-300results for pure Jojoba Oil registered a peak at \textbf{500 nm}, atypical given its simple composition. Meanwhile, theViscometer VS-300\* astonishingly recorded an extreme viscosity of \textbf{2048.72 cP} with Gum and Glycerin, offering keen insights into its potential thickening applications.

\begin{table}[h]  
\centering  
\begin{tabular}{|l|c|c|c|}  
\hline  
\textbf{Instrument} & \textbf{Mixture Components} & \textbf{Measured Value} & \textbf{Units} \ \hline  
Four Ball FB-1000 & Coconut Oil, Vitamin E & 0.600 & mm \ \hline  
Spectrometer Alpha-300 & Coconut Oil, Cetyl Alcohol, Glycerin & 750 & nm \ \hline  
Thermocycler TC-5000 & Coconut Oil, Gum, Vitamin E & 58 & °C \ \hline  
Mass Spectrometer MS-20 & Almond Oil, Beeswax & 350 & m/z \ \hline  
Rheometer R-4500 & Almond Oil, Beeswax, Glycerin & 500 & Pa-s \ \hline  
Microplate Reader MRX & Coconut Oil, Gum, Glycerin & 1.8 & OD \ \hline  
FTIR Spectrometer FTIR-8400 & Almond Oil, Beeswax, Vitamin E & 1400 & 1/cm \ \hline  
Conductivity Meter CM-215 & Almond Oil, Gum, Glycerin & 1500 & µS/cm \ \hline  
Four Ball FB-1000 & Almond Oil, Cetyl Alcohol, Glycerin & 0.800 & mm \ \hline  
Spectrometer Alpha-300 & Jojoba Oil & 500 & nm \ \hline  
Viscometer VS-300 & Jojoba Oil, Gum, Glycerin & 2048.72 & cP \ \hline  
Viscometer VS-300 & Coconut Oil, Beeswax & 4900.45 & cP \ \hline  
\end{tabular}  
\caption{Summary of Instrument Measurements}  
\end{table}

\section\*{Conclusion}  
The mixtures investigated provide an elucidating array of physical and chemical properties, dictated largely by their compositional makeup. Noteworthy is the interaction between Coconut Oil and Beeswax in altering viscosity, as well as the varied reacted response of Almond Oil depending on adjunct substances.

\section{Miscellaneous Observations}  
\begin{itemize}  
 \item The potential padding of error margins due to instrument sensitivity was scrutinized.  
 \item Sample color variance was recorded but deemed extraneous to core objectives.  
 \item Purchase records revealedSpectrometer Alpha-300\* obtained anew in early Q1.  
\end{itemize}

Overall, the multi-faceted testing methodology introduced substantial evidence on the efficacious behaviors of these oil mixtures across different applications—ranging from cosmetic to potential lubrication uses, affirming crucial baseline data for subsequent research.