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An investigation into Changes in Lubricant Oil Properties after a LongTerm Usage

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Abstract- Lubricant oils are products designed to form a protective film that reduces wear and friction of machinery moving parts, protect against corrosion, cool surfaces, and reduce energy consumption. During operation, lubricant undergoes chemical changes due to contamination and oxidation, decreasing its effectiveness up to a point that no longer meets quality specifications and needs replacement. The main objective of this study is the investigation of the changes in physical and chemical properties of lubricating oils used in different units after a long-term usage. A set of four lubricant oil samples used in the reductors and press machines were collected from different industrial plants. In experimental step density, refractive index, pH, moisture, ash and viscosities at 40 ºC were measured after and before usage. According to the experimental results, a significant decrease was observed in the dynamic viscosity of the lubricant oils from the reductors, while a negligible increase was determined in the ones collected from the presses. Besides, no significant change in refractive index and density was found for all samples. Moreover, to determine the changes in color and structure due to usage, UV spectrometer and FT-IR analyzes of both waste and virgin oil samples were also performed.

Keywords- lubricant oil, waste oil, dynamic viscosity, refractive index