



# **Investigation of the changes in chemical and physical properties in engine lubricating oils with the usage**

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## Abstract

Lubricant oils are essential fuel used in all the vehicles, and often manufacturers recommend a specific mileage range for the consumers for the replacement. People often follow recommendations prescribed by the manufactures and they replace the lubricants. In some cases, lubricants are replaced while they are still in good condition. Some individuals neglect the specifications of the lubricants and use them extensively exhausting the engines creating damages to the vehicles and resulting higher levels of emissions. Hazardous substances could form as by-products during combustion in engines and release to the environment. Often, these used lubricants are a burden to environment due to the mismanagement of the used lubricants. As such, timely draining of oil is very important in order to avoid collecting hazardous substances to the environment unnecessarily.

In this research project, attempts were made to investigate the IR properties along with the chemical and physical parameters of the lubricants for different vehicle types, *ie*, buses, cars, vans and prime movers in different environments and at different mileages.

Physical and chemical properties were monitored using different analytical tools, based on ASTM methods. The measurements were included viscosity, base number, acid number, and flash point. Wear out of the metals was analyzed by means of atomic absorption spectrometer (AAS). FTIR methods were used to measure oxidation by products and other by products generated during usage (combustion of oil) for the lubricant oil. Identification of the hazardous by products formed during combustion was monitored based on the appearance or disappearance of the FTIR signals. The trend of these properties of in service oil were analysed with the usage of the lubricant.

From the data of the research it was seen that, the lubricating oils used in all the vehicles were shown increase in acidity, aromatic properties, oxidation, nitration and decrease in alkalinity with the usage of the oil in the vehicle. Viscosity increase was seen only in cars, and other vehicles showed the viscosity drop with the mileage. Further, fewer changes in properties were seen with the use of higher performance standard oils. From the research study it was proved that the oil drain interval is not depend only on the mileage of the vehicle used after last oil change, it depends on, the total mileage run by the vehicle, environment condition of the vehicle run (traffic, road conditions *etc.*), driving habits, lubricant type used in the vehicle, the vehicle type/ model *etc*, and performance standards of lubricants used as well.