

## **EVALUATION OF BIO-ADDITIVES AS EFFECTIVE ANTI-OXIDANTS FOR COCONUT OIL BASED LUBRICANTS**

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### **ABSTRACT**

Despite having several properties of a potential lubricant, coconut oil is not used as an industrial lubricant due to lack of certain properties like low oxidative stability and high pour point. In the present study, methods are being undertaken to improve above mentioned properties of coconut oil by adding bio-additives, so that it can be used as a potential lubricant. The intention of the study is also to create an eco-friendly lubricant which supports the aspect of green technology. The additives used in the study are essential oils of ginger, black pepper and garlic, which are added at 2%, 3%, 5% concentration separately to prepare nine different samples. Propylene glycol is also added to the sample to improve the pour point. The addition of essential oil brought about a significant increase in onset temperature for oxidative degradation and substantial decrease in pour point. The pour point was further brought down by the addition of propylene glycol, which is a safe food additive. The bacterial growth on each sample is tested to ensure that the samples were eco-friendly and their disposal would not cause any harm to the environment. The dynamic viscosities of the samples are also compared with pure coconut oil to check the impact of addition of essential oil. The addition of essential oil at 3% concentration along with traces of propylene glycol to coconut oil has yielded optimum improvement in oxidative stability with substantial reduction in pour point, without significant change in dynamic viscosity.

### **1. INTRODUCTION**

Vegetable oils are perceived to be alternatives to mineral oils for lubricant base oils because of certain inherent properties and their ability for biodegradability[5][10]. Compared to mineral oil vegetable oils in general possess high flash point, high viscosity index, high lubricity and low evaporative loss[8]. Poor oxidative and hydrolytic stability, high temperature sensitivity of tribological behaviour and poor cold flow properties are reckoned to be limitations of the vegetable oils for their use as base oil for industrial lubricants[6][7]. Technical solutions such as chemical modification and addition of

certain substances have been suggested to overcome the poor oxidative stability[4][10] and high temperature sensitivity of tribological behaviour of vegetable oils when used as base oil for lubricants. Widespread use of vegetable oils as lubricants was limited in colder countries due to their high pour point[6]. Mineral oils provide various fluids which have desirable properties as lubricating oils at a reasonable cost. For that reason, most of the lubricating oils are supplied from petroleum based materials[6]. Recently the demand for environment friendly lubricants are increasing because of the high concern for