



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
SHORT ABSTRACT OF THESIS

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Thesis Title: SYNTHESIS OF BIO-LUBRICANT BASE STOCKS FROM WASTE OIL

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Thesis Submitted to the Department/ Center : Department Chemical Engineering  
Date of completion of Thesis Viva-Voce Exam : 28<sup>th</sup> February 2022

Key words for description of Thesis Work : Bio-oil, Bio-diesel, Bio-lubricant, Epoxides, Rheology, Kinetics, Artificial Neural Network, Response Surface Methodology, Genetic Algorithm

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SHORT ABSTRACT

Lubricants are oils that are often used in machines and various applications including automotive engines and hydraulic machinery to reduce friction. Most lubricants and functional fluids in the present day are made entirely from petrochemical or mineral sources, accounting for 85–90% of the total lubricant production worldwide. However, rising concerns about the environmental effects of mineral-based lubricants have prompted research in the direction of synthesis of environmentally sustainable biodegradable lubricants from vegetable oils as a possible alternative to mineral oil based lubricants. Vegetable oils have excellent biodegradability and rheological properties at higher operating temperatures, but have poor cold flow characteristics. All these technological issues of vegetable oil are well known, but they should not be seen as a barrier to the industry's adoption of green lubricants. Several methods have been attempted to solve these technological challenges, including chemical or structural alteration of fatty acid structure, genetic modification, and formulation of suitable additives or synthetic fluids. However, in this thesis, major focus is on the preparation, characterisation, and application of bio-lubricant base stocks derived from waste soybean cooking oil and its methyl esters. The prepared lubricant base stocks are ideal for hydraulic and transmission applications as an alternative to traditional lubricants in a variety of industrial applications. Also, three modelling methods, namely, Response Surface Methodology (RSM), Artificial Neural Network (ANN), and Genetic Algorithm (GA), have been applied to optimise the process parameters to maximise the product yield. Additionally, thermal degradation kinetics of the prepared product have also been attempted in this study.

