VISVESVARAYA TECHNOLOGICAL UNIVERSITY

" JNANA Sangama ", BELGAUM - 590014

PROJECT REPORT

Submitted On

"CATALYTIC DEGRADATION OF MUNICIPAL WASTE PLASTICS INTO FUEL RANGE HYDROCARBONS"

(SPONSERED BY KSCST SPP)

IN PARTIAL FULFILMENT FOR THE AWARD OF DEGREE OF

BACHELOR OF ENGINEERING

IN

CHEMICAL ENGINEERING

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ABSTRACT

Technological advancements over the last century have lead large and continuous growth in the output of plastic materials. This exponential growth has created public concern over the environmental impact caused by the polymeric waste produced. These have acted as driving forces for a lot of current research aimed at the development of plastic recycle processes. As a result, the conversion of plastic waste to useful products is gaining increasing attention.

The aim of this project work is to sustainably convert waste plastics into useful fuel range hydrocarbon mixture. Catalytic cracking process using Bentonite as catalyst (1:4 ratios) is used to achieve the aforesaid aim. A Reactor is designed with dimension 300mm height and 150mm inner diameter, made of mild steel sheet (4mm thickness). Necessary equipments such as PID controller, contactor and a k-type thermocouple complete the required circuit. Heating of reactor is done by using a 3-phase band heater.

Municipal waste plastics mainly consist of Low density polyethylene (LDPE),High density polyethylene(HDPE) and Polypropylene(PP).These are shredded, weighed and are loaded into the reactor. The reactor is gradually heated to attain temperatures as high as 430-450^0 C. The variation of temperature with time is noted down. Melting of plastics is observed at 121^{0}C (LDPE) 131^{0}C(HDPE) 150^{0}C(PP).The vapors arising due to subsequent heating of plastics quenched directly into ice cold water and oil is separated with the help of separating funnel. Physical properties like volume, density, viscosity, flash point and fire point of oil samples is determined. Chemical analysis of the oil samples is carried out by using FTIR and presence of paraffin's, olefins and naphthenes is observed in the liquid product.

Simple batch distillation of oil is carried out between a temperature range 240-260^{0}C for about 20 minutes to obtain distillate and it's analysis using FTIR shows the presence of paraffin's, olefins and naphthenes.