

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

BELGAUM



M.Tech Dissertation Report

On

**CONVERSION OF ENVIRONMENTALLY HARMFUL WASTE
PLASTIC INTO FUEL RESOURCE**

Submitted by

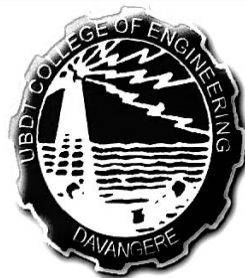
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ABSTRACT

The environmental pollution is becoming the most challenging threat to the human beings as a result of rapid industrialization and population growth throughout the world. The disposal of municipal solid waste (MSW) is currently recognized as a major environmental concerns arising especially in the industrialized regions. Plastics are one of the most used materials in today's world because of its properties as lightweight and durable material. Plastics are initially produced from petroleum which derives from crude oil. Plastics are one of the major constituents of municipal solid waste (MSW). Plastic waste MSW plants have high energy content and are suitable for fuel generation. The conventional methods like landfill and incineration have numerous disadvantages in plastic waste disposal. Recycling is the best possible solution to the environmental challenges facing the plastic waste disposal. Recycling by Catalytic degradation of waste plastics to fuel and valuable chemicals is regarded as the most promising method for plastic disposal. Catalytic degradation of waste plastic has many advantages, catalyst enhance the conversion, reduces the time and temperature.

The aim of this study is to convert waste plastics into fuel resource in a self fabricated stainless steel reactor. Bentonite and Ferric Oxide catalyst used for the process. Waste plastics selected for present study are PP, PETE and HDPE. The process was batch every time 300gm waste plastic fed into the reactor each time along with 5%, 10%, 15%, 20% and 25% of two catalysts separately. The temperature maintained in the range of 31⁰C - 490⁰C. As the concentration of catalyst increases fuel production rate also increased. PP, PETE and HDPE waste plastic to fuel yield reached upto 69.28%, 56.7% and 53.60% respectively when Bentonite catalyst being used where as 64.33%, 50.10% and 42.80% respectively when Ferric Oxide was catalyst used. The maximum diesel grade fuel yield is 60-70%, light gas 10-15% and left over residue 10-15%. The physical analysis of fuel like density, viscosity, surface tension, pour point, flash point, fire point and calorific values are within the limits of BIS standards. The time required for conversion was 1 hour to 2hour. Bentonite catalyst was most effective in enhancing the reaction at reduced time and PP waste plastic gave high fuel yield when compared to other PETE and HDPE waste plastics. Produced fuel was ignited and fuel can used as a artificial diesel.

KeyWords: MSW, PP, HDPE, PETE, Catalytic degradation.