

60. Title: Production of Liquid Fuel from Waste Plastics

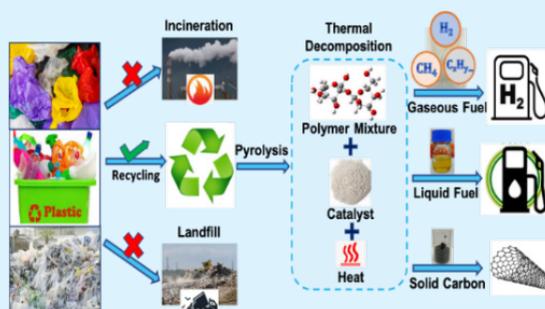
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Key Words: Plastic waste, Liquid fuel, Catalytic Cracking

Domain: Renewable Energy

Summary: Plastic waste is a serious threat to the world due to its fastest growth rate of ~ 5% per annum and requires efficient technologies for its safe disposal. Plastic liquefaction producing liquid hydrocarbons is an effective way to dispose waste plastics in an eco-friendly manner. A two-step approach for the thermo-catalytic cracking of waste plastic technique producing high-quality liquid fuel using designed reactor setup for the cracking of waste plastic is developed. The thermo-catalytic cracking occurs in the presence of metal loaded zeolite-based catalysts which will remain catalytically active up to 8-10 set of reactions with higher selectivity of petroleum range hydrocarbons. Liquid product has comparable fuel characteristics with commercial diesel. It uses PE and PP (Single-use plastics).

- » The reaction temperature for complete cracking of waste plastic is relatively at lower temperature i.e. 300-400°C.
- » It produces high liquid yield of up to 75% with maximum C6-C28 range selectivity (66.39 %).
- » It can produce up to 750-800ml of fuel range liquid hydrocarbons from 1 kg of waste plastics
- » The produced fuel can be used for the engine operation without further up-gradation
- » Modified catalyst leads to controlled cracking of waste plastic ranging between C5 to C18 i.e. gasoline and diesel fraction.



Process flow Diagram: Liquid fuel from Waste Plastics

Advantages:

- » Easy, safe, reliable and compact plastic management system with low carbon footprints
- » Economic fuel: Cost of per liter liquid can be in INR 45-55 range
- » Generated fuel can be directly used for the engine operation without further up-gradation.

Applications: Chemical Industries (Plastic Recycling Industries)

Scale of Development: A functional prototype is developed and performance is validated by testing in simulated environment.

Technology Readiness Level: 5

IP Status: Granted Indian Patent 372464, US Patent Application 17/272,580