



## Current state and future prospects of plastic waste as source of fuel: A review

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### Abstract

Due to the depleting fossil fuel sources such as crude oil, natural gas, and coal, the present rate of economic growth is unsustainable. Therefore, many sources of renewable energy have been exploited, but the potentials of some other sources such as plastics waste are yet to be fully developed as full scale economic activity. Development and modernization have brought about a huge increase in the production of all kinds of plastic commodities, which directly or indirectly generate waste due to their wide range of applications coupled with their versatility of types and relatively low cost. The current scenario of the plastic recycling technology is reviewed in this paper. The aim is to provide the reader with an in-depth analysis with respect to the pyrolysis of plastic waste as obtained in the current recycling technology. As the calorific value of the plastics is comparable to that of hydrocarbon fuel, production of fuel from plastic waste would provide a good opportunity to utilize the waste as a better alternative to dumpsites. Different techniques of converting plastics waste into fuel including thermal and catalytic pyrolysis, microwave-assisted pyrolysis and fluid catalytic cracking are discussed in detail. The co-pyrolysis of plastics waste with biomass is also highlighted. Thus, an attempt was made to address the problem of plastic waste disposal as a partial replacement of the depleting fossil fuel with the hope of promoting a sustainable environment.

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### Abbreviations

LDPE, low density polyethylene; HDPE, high density polyethylene; PP, polypropylene; PVC, poly (vinyl chloride); PS, polystyrene; PET, poly (ethylene terephthalate); MSW, municipal solid waste;

MPW, municipal plastic waste; BTX, benzene, toluene and xylene; BET, Brunauer, Emmett and Teller method (for surface area analysis); LHV, lower heating value; CV, calorific value; PAH, polycyclic aromatic hydrocarbon; TMAH, tetramethyl ammonium hydroxide; TPA, terephthalic acid; AIBN, azoisobutylnitrile; RDF, refuse-derived fuel; HBL, hard burnt lime; PLA, poly(lactic acid); CSBR, conical spouted bed reactor; FCC, fluid catalytic cracking; FTIR, Fourier-transformed infrared; MAP, microwave assisted pyrolysis; VGO, vacuum gas oil; LCO, light cycle oil; PBD, polybutadiene; LPG, liquefied petroleum gas

## Keywords

Pyrolysis; Polymer; Review; Fuel; Plastics

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