From Waste to Watt

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ABSTRACT

Interest in producing alternative fuels from waste materials has increased due to the growing demand for renewable energy sources worldwide. This study investigates two novel techniques using two common waste materials one is organic waste and second one is plastic. Waste plastic were converted into gasoline and biogas was produced from animal manure. One important source for the anaerobic digestion process that produces biogas is animal dung, a commonly accessible organic waste. The findings demonstrated that the anaerobic bacteria decomposed the organic waste and produced methane gas when the temperature and pH were regulated. The amount of dung and the ideal circumstances were directly correlated with the amount of biogas generated. For every kilogram of cow dung, the average methane output was 0.35 m^3. The conversion of waste plastics into petrol was achieved through a process known as pyrolysis. 60% of the entire mass of processed waste plastic was converted into liquid gasoline. The generated fuel showed potential as an alternative fuel source because its calorific values were comparable to those of regular gasoline. Additionally, by turning plastic trash into useful energy, this procedure lessens the impact of plastic waste on the environment. Therefore, both methods were found very useful for turning waste into valuable products.

Keywords: Biogas, Green House Gas, Organic Waste, Fossil Fuels, Plastic Waste.

INTRODUCTION

Interest in renewable energy sources and waste-to-energy technology has increased as a result of the growing global need for energy as well as the environmental problems caused by waste management and the use of fossil fuels. Among the many options, the creation of biogas from organic waste and the transformation of plastic waste into useable fuels like gasoline have shown promise. The main components of biogas include ammonia (NH_3) (1–2%), hydrogen sulfides (H_2S), hydrogen (H_2), carbon dioxide (CO_2) (25–50%), methane (CH_4) (50–75%), and trace amounts of other gases such oxygen (O_2) and nitrogen (N_2). In several fields, including transportation and the production of heat and electricity, methane can take the place of fossil fuels. Pyrolysis, which turns waste plastics into fuels like gasoline, is a relatively recent field of study. Liquid oil, gas, and solid char are the products of pyrolysis, which is the heat breakdown of organic molecules without oxygen.

OBJECTIVE

Energy production and environmental sustainability are the main objectives of this study.

METHODOLOGY

For Biogas Production

- After pretreatment of organic waste, the mixture was then transferred to a container.
- An anaerobic digester, a sealed container intended to provide an oxygen-free environment, is subsequently filled with the organic waste mixture. This could be either a continuous flow reactor or a batch reactor.

- Biogas production was started after a week.

For Petrol Production

- The waste plastic were put into a sealed chamber called a pyrolysis reactor, which was used to heat materials without oxygen. Usually, either an external heat source or some of the plastic feedstock itself is burned to heat the reactor.
- The reactor was kept at high temperature to break down plastic into shorter hydrocarbons at this high temperature.
- After each phase separation, petrol was obtained.

RESULT

Biogas Production	
Output	Average 0.35 m^3 per kilogram of organic waste
Flame Test	Blue flame with rotten eggs smell
Petrol Production	
Output	60% of the total amount of plastic waste
Boiling Point	200 ℃

CONCLUSION

- Anaerobic digestion of organic waste produces biogas, which is a very efficient way to solve waste management problems and provide sustainable energy.
- The procedure lowers greenhouse gas emissions.
- Pyrolysis, which turns waste plastics into gasoline, offers a convincing answer to the growing issue of plastic waste and the demand for alternative fuels.
- Although there are still more work to do with increasing the fuels' efficiency and purity. It provides a way to address environmental problems of plastic pollution and
- Reliance on fossil fuels, assisting in lowering the combined environmental effect of both.

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