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Generating of Fuel from Waste Plastic

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Abstract

Plastics plays the major role in our day-to-day lives and huge usage of plastic and no proper recycling methods they pose a tremendous threat to the environment. Over a 100 million tonnes of plastics are produced annually worldwide, and the used plastic products have become a common feature at over bins, landfills and also in water bodies too. The plastic waste not only creates the air pollution but also water and soil pollution too. Here, the process of converting waste plastic into value added fuels is explained as a solution for recycling of plastic waste. Hence by this study the two problems are going to solved i.e., waste plastic and fuel shortage. In this study, plastic wastes (low density polyethylene)were used for the pyrolysis to get fuel oil that has the same physical properties as the fuels like petrol, diesel etc.

Pyrolysis runs without oxygen and in high temperature of about 300°C which is why a reactor was used to provide the required temperature for the reaction. The waste plastics are subjected to depolymerisation, pyrolysis, thermal cracking and distillation to obtain different value added fuels such as petrol, kerosene, and diesel, lube oil etc. Thus, the process of converting plastics to fuel has now turned the problems into an opportunity to make wealth from waste. The hazards of plastic waste is well known to us. The conversion of oil from plastic has dual benefits. First of all the oil produced can be used as a fuel for domestic purposes and also in vehicles and industries when further refined. Secondly the various types of pollution caused due to waste plastics can be minimized. Therefore the waste plastic can be converted back into it. For the process of conversion a machine can be used which will heat the plastic to a temperature so that it melts and does not burns.

Keywords: Waste plastic, fuel generation and pyrolysis

Introduction

Every human being generates 280 million tons of waste plastic in his life period. Huge usage of plastic leads to many problems such as they will occupy the whole earth if there is no any proper recycling or reusing methods, burning of plastics in open environment without any any proper attachments they will release many harmful gases so they will creates the air pollution, If the plastic is thrown in any open lands it takes many years to degrade and they will decrease fertility levels of the soil thus the land is not suitable for farming, if the plastics are thrown in any water bodies they threats to aquatic system. In order to overcome some of this problems it is the better way to do this.

Objective:

i). To generate Fuel from waste plastic.
ii). To recycle the waste plastic

Methodology

Required Equipment

1. Plastic bottles.
2. Gas cylinders.
3. Stove.
4. Cooker.
5. Storage tank
6. Pipe.
7. Valves.
8. Gauges.
9. Plastic can.

1. **Plastic Bottles:** Plastic bottles as shown in Figure 1 are the raw material for the generating of fuel. The low density plastic bottles are mainly used. They also melts in low temperatures which was provided by any stove.

Fig 1: Plastic Bottles

2. **Burner:** Burner as shown in Figure. 2 is used to generate heat to melt the plastic. The burner is connected to any external cylinder by the help of hose.

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Fig 2: Burner

3. **Container:** Container as shown in Figure. 3 is used to heat the plastic till it changes the phase i.e., from solid to vapour. The container is provided with a hose in order to collect the vapour

Fig 3: Container

4. **Storage Tank:** Storage tank as shown in Figure 4 is used to store the generated fuel. It condenses the generated the vapour into the liquid fuel.

Fig 4: Storage Tank

5. **Hose:** Hose as shown in Figure 5 is used to deliver the gas from the container to gas analyser. It also consists of valve to control the moment of the vapour.

Fig 5:

6. **Gas Analyser:** Gas analyser as shown in Figure 6 is used to analyse the produced gas. Then the gas can be directly used for combustion by adding some required chemicals.

Fig 6: Gas Analyser

Gas analyser is used to analyse the produced gas. Then the gas can be directly used for combustion by adding some required chemicals.

Procedure

- Take one kg of plastic bottles.
- Burn the waste plastic in the pressure cooker.
- After the burning of waste plastic it slowly produce the fuel.
- It comes in the form of vapour.
- The vapour goes in to the tube and it is stored in another can.
- The liquid form of fuel is appeared in the can.
- After the filtration of the fuel it is can be used.

Result and Discussion

The liquid fuel is generated from the above experiment.

Now, the generated liquid fuel is not directly used in combustion engines or etc. Because it doesn't have required calorific values and some of the essential parameters of the fuel. Such that, some of the chemicals mixed with it.

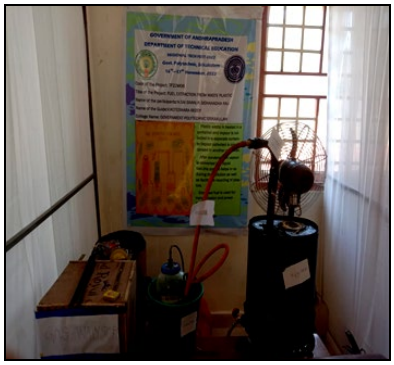

Fig 7:

Conclusion

Pyrolysis of hydrocarbon polymer is a very complex process which consists of hundreds of reactions and products. The obtained results demonstrated that conversion of waste plastic to fuel is upto 92.33% which is greater than that obtained using virgin poly-propylene when sodium bi-carbonate was used. Therefore, waste plastic is fuel can be used an alternative fuel and can be used in the CI engine after doing some enhancements.

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