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COMPARATIVE STUDY ON FUEL PRODUCED FROM WASTE PLASTICS USING PYROLYSIS PROCESS.

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ABSTRACT

The production of synthetic fuels from alternative sources has increased in recent years as a cleaner, more sustainable source of transport fuel is now required. In response to European renewable energy targets, Ireland has committed, through the Biofuels Obligation Scheme of 2008, to producing4% of transport fuels from biofuels by 2010 and 10% by 2020. In order to be suitable for sale in Europe, petrol fuels and petrol must meet certain European fuel specifications outlined in the EN 590:2004 and EN 14214:2009 standards. The aim of this project is to prepare blends of varying proportions of synthetic petrol fuel (Cyn-petrol), produced from the pyrolysis of plastic, versus regular fossil petrol. The viscosity (mm^2 /s) and density (kg/m^3) of these blends as well as of the regular petrol fuel were analyzed in relation to compliance with the European fuel standard EN 590.

Keywords: FOSSIL ENERGY,PYROLYSIS PROCESS, BLEND PROPORTION, CALORIFIC VALUE, PLASTIC FUEL, VISCOSITY.

I. INTRODUCTION

- The present rate of economic growth is unsustainable without saving of fossil energy like crude oil, natural gas, or coal. There are many alternatives to fossil energy such as biomass, hydropower, and wind energy. Also, suitable waste management strategy is another important aspect. Development and modernization have brought about a huge increase in the production of all kinds of commodities, which indirectly generate waste. Plastics have been one of the materials because of their wide range of applications due to versatility and relatively low cost.
- Approximately **10–20 million tons of plastic** end up in the **oceans each year**. A recent study conservatively estimated that **5.25 trillion plastic** particles weighing a total of 268,940 tons are currently **floating in the world's oceans**. And since plastic being a non-biodegradable material it remains into the soil, thereby polluting the environment.

- Our Project deals with the extraction of **OIL** from the **waste plastics** termed as **PLASTIC PYROLYZED OIL** which can be marketed at much cheaper rates compared to thatpresent in the market and this pyrolyzed oil has been used to run 4 stroke engines.

II. OBJECTIVES

- Waste plastic have been procuredfrom municipal corporation.
- Raw waste plastics are crushed in Crusher to form pellets.
- Developing of pyrolysis unit to produce fuel from plastics.
- The plastics pellets are subjected to pyrolysis process.
- The crude fuel will float on the water because of its density and viscosity. Later the fuel will be collected.
- The crude fuel is subjected to testing such as Calorific Value, Flash & Fire Point and Viscosity and carbon residues test.
- Purified plastic fuel can be blended with petrol with different blend proportions for an effective result.

III. METHODOLOGIES

- Waste plastic materials have been procured.
- Raw waste plastic materials are crushed in Crusher to form pellets.
- Developed pyrolysis unit to produce fuel from plastics a shown in figure,
- **Pyrolysis Process:** Heating plastic pellets in the heater for about 340^0 C in order to convert it into steam and then condensed in water for 3hrs.
- Then crude fuel will float on the water because of its density and viscosity.
- Later the fuel was collected from the process and the crude fuel are subjected to testing such as Calorific Value, Flash & Fire Point and Viscosity and carbon residues test.
- Purified fuel is blended with petrol with various percentages and results are compared with pure petrol

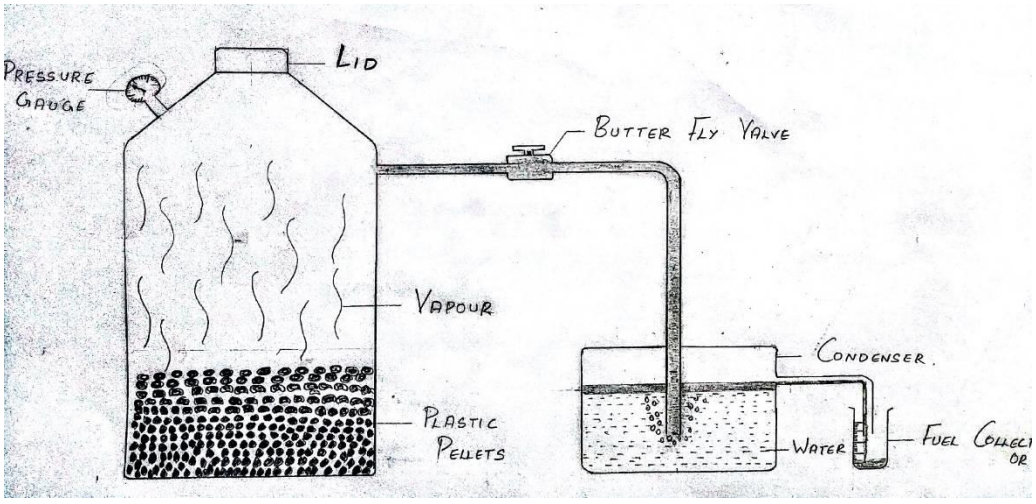

FIG 1 :DRAFT SKETCH OFPYROLYSIS

FIG 2: PYROLYSIS PROCESS

FIG 3: FUEL COLLECTED FROM WASTE PLASTICS

IV. RESULTS AND DISCUSSION

The fuel is to be extracted in large quantity around 3-5 liters by burning the waste plastic pellets.

Further the extracted fuel is blended with pure petrol in ,5, 7,15, 20 in blending proportion

OBTAINED PLASTIC FUEL +PETROL.

TO 5 %

7%

10%

15%

20% = BLENDING PROPORTIONS

50%

60%

Then finally blended fuel is undergoing for performance and emission test in petrol engine.

TABLE 1: RESULTS

PETROL	PLASTIC FUEL
VISCOSITY: 1.5 to 4 poise	2.8 poise
DENSITY: 720 -775 kg/m3	622.17 kg/m3
FIRE POINT: 25˚C	30 ˚C
CLOUD POINT: 1˚C - 3˚C	7˚C
CALORIFIC VALUE :45.80 MJ/KG	40.70 MJ/KG

V. CONCLUSION

We have come across the solution for the conversion of waste plastic to usable fuel, as per the research conducted on fossil fuel, there is drastic demand in production of fossil fuel, hence alternate source has been conducted.Experimental investigation has been carried out on the plastic fuel and comparative study has been made.The results show the plastic fuel properties are very same as petroland can be used to run petrol engine, so blending of waste plastic oil and petrol fuels will obtain better quality of oil.

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