INTRODUCTION

Pyrolysis is a thermo chemical decomposition of organic material at elevated temperatures in the absence of oxygen. It involves the simultaneous change of chemical composition and physical phase, and is irreversible. Solar energy is radiant light and heat from the Sun harnessed using a range of ever-evolving technologies such as solar heating, photovoltaic, solar thermal energy, solar architecture and artificial photosynthesis. In our project we are using Scheffler dish as the source of harnessing the solar energy the Scheffler dish is made of number of mirror which will focus all the light on to a fixed focal point where the temperatures are about 500°C. This temperature is enough for the pyrolysis process, the plastic filed inside the boiler, will get melt after reaching temperature about 120°C , later after reaching maximum temperature about 250°C, the liquid starts to evaporated, which will liberate some gases later this gases are been passed through the condenser which will cool them & convert into liquid fuel. After collecting the liquid fuel testing can be done to check the calorific value.

Objective

- Recycling of waste plastic
- Pyrolysis of waste plastic
- Using Solar Energy for Pyrolysis
- Alternative fuel
- Optimum utilization of Solar Energy

Methodology

The methodology is explained with flow chart as shown below-
**TEST RESULTS:** a bomb calorimeter will measure the amount of the heat generated when matter is burnt in a sealed chamber (bomb) in an atmosphere of pure oxygen gas. The advanced isothermal bomb calorimeter provides a simple inexpensive yet accurate method for determination of heat of combustion, calorific value and the sulphur content of solid and liquid fuels. The outfit supplied is complete for analysis as per methods recommended the indian standards institution (is : 1359-1959). British standards institution (bs 1016 : part 5 : 1967) and the institute of petroleum (ip 12/63 t). Each part of the outfit has been finished and tested according to the specifications laid down by these institutions.

**Observations**

- Thread Diameter: $D = 8\text{cm}$
- Nichrome Wire Length: $L = 7.5\text{cm}$
- Fuel sample weight: $M = 0.9876 \text{gm}$
- Temperature Difference: $T = 2.61 \degree\text{C}$
- Water equivalent: $W = 2936 \text{cal/} \degree\text{C}$
Calculations

W  Water equivalent of the calorimeter assembly in calories per degree centigrade (2936 cal / °C)

T  Rise in temperature (registered by a sensitive thermometer) in degree centigrade

H  Heat of combustion of material in calories per gram

M  Mass of sample burnt in grams

Then \( W \times T = HM \)

"H" is calculated easily since \( W, T \) and \( M \) are known.

\[
H = \frac{W \times T}{M}
\]

\[
H = \frac{2936 \times (37.01 - 34.40)}{0.9876}
\]

\( H = 7759 \text{ cal/gm.} \)

Converting from cal/gm to KJ/kg We have,

\( H = 32,485.38 \text{ KJ/kg} \)

**CONCLUSION**

The present study was conducted with one of most temperature sensitive process in industry using solar energy and the recyclable material plastic. This study also concludes that these types of innovative solar concentrators can open new landmarks in decentralized solar based systems. In addition, other benefits like reduction of fossil fuels consumption and global warming cannot be ignored. The study also suggests that such types of systems must be equipped with necessary mountings and instrumentations to monitor and control the
desired output of the fuel and utilization of the same in the coming revolution.

The following key factors are highlighted during the development process of the project:

- Fuel extraction from waste plastic
- The project is environmentally friendly
- Less complicated in construction
- Energy is abundant in nature, i.e., solar energy
- Lowest production cost when compared to other conventional methods
- Reduction in waste plastic
- Solar Setup can be used for other purposes like cooking.

The following are the limitations of the project:

- Due to the wind heat transfer may affect.
- Process can be done only on sunny days as solar energy is involved.
- Few toxic gases may arise; hence care should be taken during the process.

**Scope of Project**

- Utilization of plastic waste oil as alternative fuel for compression ignition engines has great scope especially in developing and undeveloped countries.
- Reduction of plastic waste in the environment.
- Reduction of greenhouse gases.

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