WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

"Integrated Renewable Energy To Produce Crude Oil From Plastic"

Deepak B Desai[1], Akhilesh V Angadi[2], Abhay R Patroti[3], Chetan S Ankali[4], Prof. S. B. Zampa[5], Prof. Vishwanath M Khadakbhavi [6], Dr. Rajendra M Galagali[7]

[1] Dept Mechanical Engineering s.g.b.i.t college, Bgm, India deepakbdesai27@gmail.com
[2] Dept Mechanical Engineering s.g.b.i.t college, Bgm, India akhileshangadi007@gmail.com
[3] Dept Mechanical Engineering s.g.b.i.t college, Bgm, India mrarp2732@gmail.com
[4] dept mechanical engg s.g.b.i.t college, Bgm, india Chetanankali900@gmail.com
[5-7] Dept Mechanical Engineering s.g.b.i.t college, Bgm, India

ABSTRACT –

Comfort coupled with safety and simplicity is what man strives for. Our project has been to bring about it. The culmination of our effort has resulted in development of a new " INTEGERATED RENEWABLE ENERGY TO PRODUCE CRUDE OIL FROM PLASTIC" The project presents a basic as well as very professional subject in a very comprehensive way, based on learning effort and understanding capability of today as per then levels. The device is simple and comfortable. Basic calculation, drawing, designing is included in the project The salient features of our machine can be listed as the mechanism used is very simple, easy for operation; no skill is required to operate the system.

Key words:

- Plastic waste
- Pyrolysis process
- Boiler
- Fuel
- Condenser.

INTRODUCTION :

The rapid increase in plastic production and consumption over the past century has led to a global environmental crisis. Ecosystems and human health are seriously threatened by the buildup of nonbiodegradable plastic garbage in landfills and oceans. Concurrently, there is an increasing global need for sustainable energy sources to lessen reliance on fossil fuels and fight climate change.
The goal of this initiative is to employ an inventive way to address these important 11 issues: employing a pyrolysis process powered by sustainable energy, such biogas, to turn plastic waste into crude oil. It has been demonstrated that pyrolysis, a thermochemical decomposition process 20 without oxygen, is a successful way to convert plastic waste into useful hydrocarbons.
However, the energy-intensive and fossil fuel-dependent nature of conventional pyrolysis greatly offsets any potential environmental benefits.

To overcome challenges, Is a project integrates biogas—a renewable energy is a source of produced in organic waste—into the pyrolysis process. Biogas serves as a clean and sustainable energy input, significantly reducing the process's carbon footprint. By combining plastic waste management with biogas utilization, this project highlights a dual solution to the global waste and energy crises.

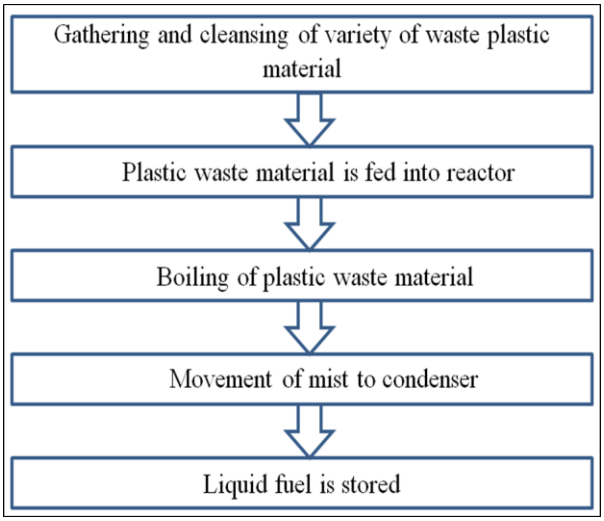
Literature Survey :

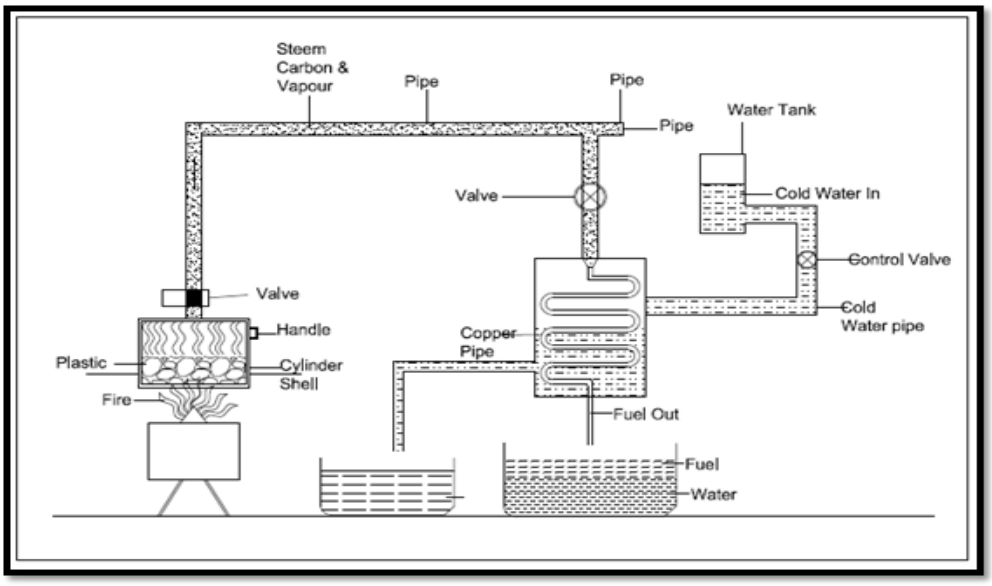
Plastic Waste Management and Pyrolysis Technology
Author: A. Demirbas (2004)
Title: "Pyrolysis of Municipal Plastic Wastes for Recovery of Gasoline-Range Hydrocarbons"
Key Findings:
Pyrolysis is an effective thermochemical process in converting plastic waste in liquid fuels.
High-density polyethylene (HDPE) and polypropylene (PP) provide higher crude oil yields with lower gas production.
maximum yield ranges between 400–500°C.
Relevance: This study provided the foundational understanding of pyrolysis as the technology in converting plastic waste into hydrocarbons.

2. Utilization of the Biogas as the Renewable Energy Source
Author: M. Kumar et al. (2019)
Title: "Biogas Production and Its Role in Sustainable Energy Development" Key Findings:
Biogas, produced from organic waste, as a clean and renewable energy source with significant calorific value (~22–26 MJ/m³).
Biogas will replace conventional fuels for heating and power generation, reducing carbon emissions.
Relevance: This study highlights the potential of biogas to power energy-intensive processes like pyrolysis, ensuring sustainability.

OBJECTIVE :

- To design and implement a pyrolysis system powered by biogas technologies.
- Significance of the Project: The project emphasizes the potential of biogas in sustainable energy systems, showcasing its versatility beyond to convert the plastic waste in the crude oil with high efficiency and minimal reliance on fossil fuels.
- To analyze the quality of crude oil produced and its potential applications.
- conventional uses. By utilizing biogas to power the pyrolysis process
- This innovative approach underlines the importance of renewable energy, especially biogas, in tackling environmental and energy challenges



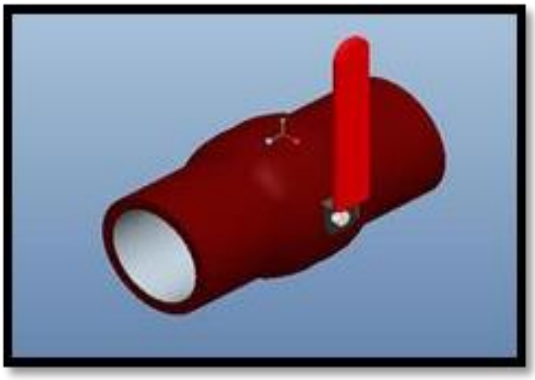


BOILER

Boiler is the main part of this working system, it is made up off mild steel sheet 16 gauge to which base plate welded. The diameter of this boiler is 360mm a nd have height of 300mm. the main purpose of this boiler is to heat the melt the waste plastic and convert it into vapor form. The capacity of this boiler is 30000 cc. the heat is supplied externally by the burner positioned below. For the fastening purpose a flange of same material is welded to the top of the boiler and tapping is done on the periphery of the flange.

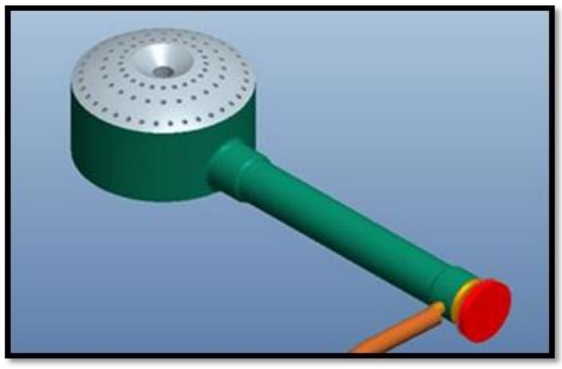
C. CONTROL VALVE:

A hollow, perforated, pivoting ball is used by ball valves, a form of quarter-turn valve, to regulate flow. When the ball's hole aligns with the flow, it is open; when the valve handle rotates it 90 degrees, it is closed. Visual confirmation of the valve's condition is made simple by the handle, which is perpendicular to the flow when closed and flat in alignment with it when open.The flow valve is used for the regulating the vapor flow.



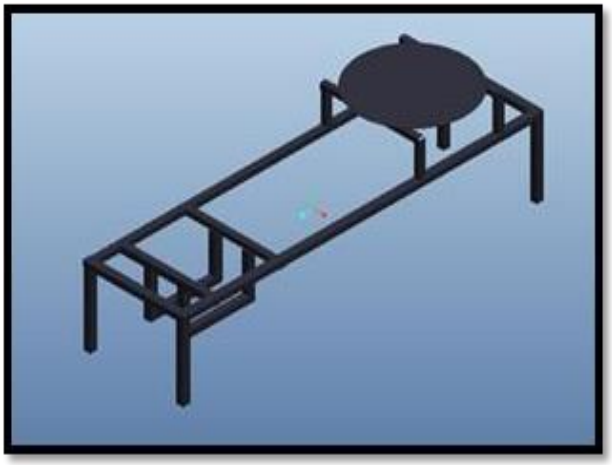
CONDENSOR

In systems involving heat transfer, a condenser is a device or unit used to condense a substance from its gaseous to its liquid state, by cooling it. In this system we have used a mixing type condenser, in which vapor directly comes in contact with water and gets condensed into fluid form. The condensate due to its density floats in the water of surface.



BURNER

Burner is a part situated below the boiler to provide a heat by burning LPG (liquid petroleum gas). Burner act as a main source of heat for boiler but we can use other sources of heat also like concentrated solar heater, exhaust gases for the power plants, electric heater and bio fuels has been used. The burner is provided with a control valve for regulating the flow of LPG



3.Plastic to Fuel Convert Machine

RESULTS & DISCUSSIONS :

After boiling the waste plastic the mist is generated in the boiler and is cooled i n the condenser and the mist is converted into liquid form, properties of this liquid is similar to the properties of petrol and the below table is the comparison of extracted fuel with other fuels.

Crude Oil Yield from Plastic Waste

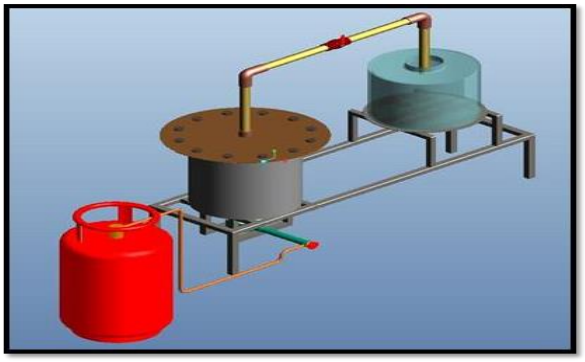
The experiment in the results demonstrate this plastic waste, subjected to thermal pyrolysis integrated with renewable energy, produced significant crude oil output.

Input Plastic Material: Mixed plastic waste (HDPE, LDPE, and PP) Energy Efficiency of the Process

6. METHODOLOGY :

DESIGN OF CAD MODEL

Fig. 5 CAD Model



ASSEMBLY OF THE PHYSICAL PROTOTYPE.

Fig.6 Hardware

FUTURE SCOPE AND CONCLUSION :

The conversion of waste plastic into crude oil using biogas presents a promising and sustainable approach to managing plastic waste while addressing the rising demand for alternative energy sources. In the future, advancements in pyrolysis technology and the optimization of biogas as a cleaner heat source can enhance process efficiency 3 and reduce environmental impacts. By turning garbage into useful resources, scaling up this technology can support the circular economy.

Therefore, integrating automated systems and sophisticated catalysts will improve crude oil yield and process stability. As a result, the research ends with a potential waste management and energy source that eventually creates avenues for environmentally benign, commercially feasible advances in the energy industry.

Industrial collaboration are essential to unlocking its full potential and contributing to global sustainability goals.

REFERENCES :

1. **"Review and Design Overview of Plastic Waste-to-Pyrolysis Oil Conversion with Implications on the Energy Transition"** (2023): This study presents an in-depth analysis of plastic solid waste (PSW) and discusses how plastic wastes can be technically used for oil production through pyrolysis. *onlinelibrary.wiley.com*
2. **"Experimental Investigation on the Extraction and Characterization of Plastic Oil from Polypropylene (PP) Plastic Waste Using Pyrolysis Method"** (2024): This research focuses on extracting plastic oil from PP plastic waste via pyrolysis and compares the properties of the obtained oil to diesel. *pmc.ncbi.nlm.nih.gov*
3. **Design and Fabrication Model is Used to Extract Waste Plastic to Bio-Oil"** (2024): This work explores the production of automotive bio-diesel fuel from plastic waste through a two-step thermochemical process based on pyrolysis. *researchgate.net*
4. **"Utilizing Waste Plastic Bottle-Based Pyrolysis Oil as an Alternative Fuel in Diesel Engines"** (2022): This study investigates the feasibility of using waste plastic oil derived from the pyrolysis of waste polyethylene terephthalate (PET) bottles as an alternative fuel in diesel engines. *pubs.acs.org*