DESIGN AND FABRICATION OF SYSTEM PRODUCE OF OIL FROM WASTE PLASTICS

A thesis report submitted to the department of mechanical engineering for the partial fulfillment of the degree of Bachelor of Science in Mechanical Engineering.

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APPROVAL

This is to certify that the project on **"Design and Fabrication of system to Produce oil from waste plastics"** By Atikul islam (ID No: BME1903019312), Md. Foysal Islam(ID No:BME1903019261),0147Lima Akter (ID No:BME1903019394), Rasel Mollah (ID No: BME1903019491) Md. Shak Sadi (ID No:BME1903019426) has been carried out under our supervision. The project has been carried out in partial fulfilment of the requirement of the degree of Bachelor of Science in Mechanical Engineering of years of 2023 and has been approved as to its style and contents.

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DECLAERATION

We hereby declare that the work presented in project is the outcome of the investigation and research work performed by us under the supervision of "Md. Minhaz Uddin"**,** Assistant Professor, Department of Mechanical Engineering, Sonargaon University (SU). We also declare that no part of this project and thesis has been or is being submitted elsewhere for the of any degree.

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ABSTARCT

The study focused on the design and fabrication of a waste plastic oil converter as an effort in finding environment-friendly means of waste recycling. It is an alternative solution to increasing problem of waste disposal by converting waste plastics into a resource. Pyrolysis process was the basis in the design and fabrication of the equipment. It is a prototype/laboratory scale model that will serve as baseline in developing technology for energy. recovery from waste plastics. The main components were the reactor assembly, condensing chamber, vapor line assembly, the reactor tank is made of steel sheet with holding capacity of 200g/batch of waste plastic. The equipment was tested for five trials using 200g of Polypropylene (P.P) plastics per trial. The temperature was controlled at 400℃ and operating hour of 2 hours. Test result showed that the equipment is functional with conversion efficiency (wt %) of 61.8%, waste reduction efficiency (wt %) of 94.3% and oil recovery of 800 ml oil/kg of Polypropylene plastic.

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CHAPTER 1
INTRODUCTION

1.1 Introduction

Plastic waste has become a global environmental concern due to its significant impact on ecosystems, human health, and natural resources. The traditional disposal methods, such as landfilling and incineration, contribute to pollution and greenhouse gas emissions. As a result, there is a pressing need for sustainable solutions to manage and recycle plastic waste effectively.

One innovative approach to address the plastic waste problem is the production of oil from waste plastics. This process involves converting discarded plastic materials into valuable hydrocarbon products, such as crude oil or fuel. The concept behind this approach is to utilize the carbon content of plastics, which is derived from petroleum, and transform it back into a usable form.

The production of oil from waste plastics offers several potential benefits. Firstly, it provides an alternative source of energy and reduces the reliance on fossil fuels. By converting plastic waste into oil, we can decrease the demand for virgin petroleum, conserving valuable natural resources. Secondly, it offers a solution for plastic waste management, diverting plastics from landfills and oceans and reducing their environmental impact. Lastly, it has the potential to create economic opportunities by establishing a market for recycled plastic products and generating revenue from the produced oil.

Various methods and technologies have been developed to convert waste plastics into oil, with pyrolysis being the most widely employed. Pyrolysis involves heating plastics in the absence of oxygen, causing them to break down into smaller hydrocarbon molecules. The resulting oil can be further refined and processed to obtain different products, such as gasoline, diesel, or chemical feedstock.

The effectiveness of the production process depends on several factors, including the type of plastics used, the composition of the waste stream, the operating conditions, and the presence of catalysts. Different types of plastics have varying chemical structures and properties, requiring specific treatment methods to optimize the oil yield and quality. Additionally, the presence of contaminants in the waste plastics can impact the process efficiency and the purity of the resulting oil.

This study aims to provide an in-depth exploration of the production of oil from waste plastics. It will examine the different technologies and methods used, with a focus on pyrolysis, and discuss the factors that influence the process and the quality of the produced oil. Furthermore, the economic and environmental aspects of oil production from waste plastics will be analyzed, considering the cost-effectiveness and sustainability of the approach.

By understanding the challenges and opportunities associated with the production of oil from waste plastics, we can develop strategies and technologies that contribute to a circular economy and a cleaner, more sustainable future.

1.2 Objective

The objective of the production of oil from waste plastics is to develop a sustainable and efficient process to convert plastic waste into valuable hydrocarbon products. The key objectives include:

1. Reduce the environmental impact of plastic waste by diverting it from landfills and oceans and transforming it into a valuable resource.

2. Decrease the reliance on virgin petroleum by utilizing the carbon content of plastics and converting it back into a usable form of oil.

3. Generate an alternative source of energy by producing oil that can be used as a fuel or feedstock for various applications.

4. Establish a market for recycled plastic products and create revenue streams from the production and sale of the converted oil.

5. Explore different methods, technologies, and operating conditions to maximize oil yield and improve the quality of the produced oil.

By achieving these objectives, the production of oil from waste plastics aims to contribute to a circular economy, reduce plastic pollution, and promote a more sustainable and resource-efficient approach to plastic waste management.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The production of oil from waste plastics is an emerging and promising approach to address the environmental challenges associated with plastic waste. Plastic pollution has become a pressing global issue, and finding effective ways to manage and recycle plastic waste is of paramount importance. Converting waste plastics into valuable hydrocarbon products, such as oil, offers a sustainable solution by reducing the environmental impact and creating economic opportunities.

This literature review provides a concise overview of the existing research on the production of oil from waste plastics. It summarizes the key findings, methodologies, and challenges discussed in the literature, aiming to highlight the advancements made in this field.

The review begins by exploring the different methods and technologies utilized for the conversion of waste plastics into oil, with a focus on the widely used pyrolysis process. It briefly touches upon alternative techniques like hydrothermal liquefaction and gasification.

2.2 History

The history of the production of oil from waste plastics is relatively recent, as the environmental impact of plastic waste has gained significant attention in recent decades. The need for sustainable solutions to manage plastic waste and reduce reliance on fossil fuels has spurred research and development in this field. This section provides a brief overview of the historical development of the production of oil from waste plastics.

The early research on plastic waste management primarily focused on mechanical recycling, where plastics were mechanically processed to produce recycled materials. However, as the limitations of mechanical recycling became apparent, researchers began exploring alternative methods to address the growing plastic waste problem.

In the 1970s and 1980s, the concept of pyrolysis, a thermal decomposition process, emerged as a potential method for converting plastics into oil. Initial studies focused on the pyrolysis of individual plastics, such as polyethylene and polypropylene, to obtain liquid fuels.

These early investigations provided insights into the pyrolysis process and its potential for transforming plastic waste into valuable hydrocarbon products.

Throughout the 1990s and early 2000s, research efforts intensified, with studies focusing on optimizing the pyrolysis process and expanding its applicability to various types of plastics. Researchers explored the influence of different operating conditions, such as temperature, heating rates, and residence time, on the pyrolysis efficiency and the quality of the produced oil. Catalysts were also introduced to enhance the pyrolysis process and improve the yield and properties of the resulting oil.

As concerns regarding plastic waste and sustainability grew, the production of oil from waste plastics gained further attention in the 2010s. Research expanded to investigate the feasibility of scaling up the process and evaluating its economic viability. Studies explored the utilization of mixed plastic waste streams, including post-consumer plastics and industrial plastic waste, to assess the potential for large-scale implementation.

In recent years, there has been an increasing focus on improving the environmental performance of the production process. Researchers have examined strategies to reduce greenhouse gas emissions during pyrolysis, explore the potential for carbon capture and utilization, and investigate the utilization of renewable energy sources for process heat.

CHAPTER 3

METHODOLOGY

3.1 Process of Project

- Creating an idea for Production of oil from waste plastics.
- And designing a block diagram to know which components need to construct it.

3.2 Block Diagram

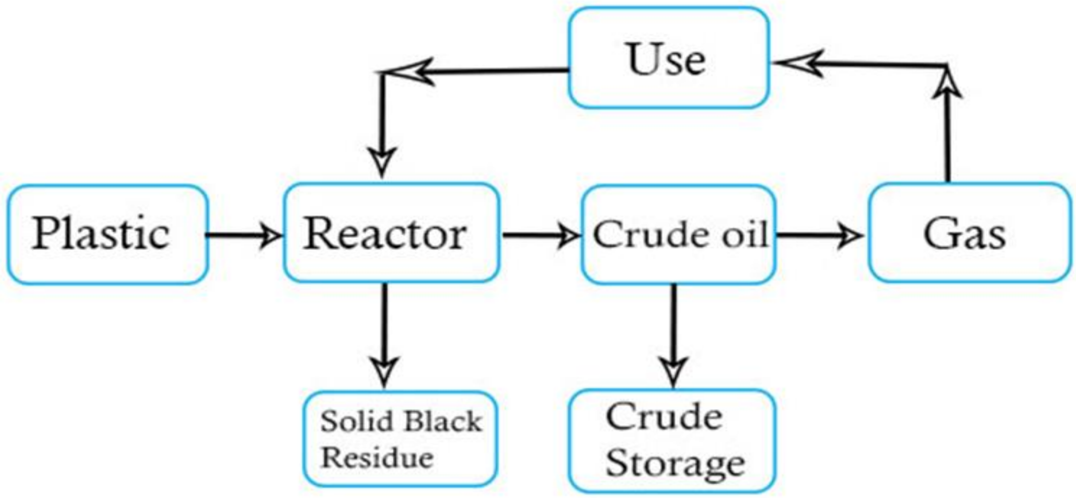

Figure 3.2: Block diagram for Production of oil from waste plastics

3.3 Working Principle

The production of oil from waste plastics is a process called pyrolysis. Pyrolysis is the thermal decomposition of organic materials in the absence of oxygen. This process breaks down the long carbon chains in plastics into smaller molecules, including oil, gas, and char.

The pyrolysis process can be carried out in a variety of ways, but the most common method is to use a furnace. The furnace is heated to a high temperature, typically between 300 and 500 degrees Celsius. The waste plastics are then placed in the furnace and heated until they decompose.

The oil that is produced from pyrolysis can be used as a fuel or as a feedstock for other chemical processes. It is a renewable and sustainable alternative to fossil fuels, and it can help to reduce the amount of plastic waste that ends up in landfills and incinerators.

The following are the main steps involved in the production of oil from waste plastics:

1.Collection of waste plastics: The first step is to collect waste plastics. This can be done from a variety of sources, including landfills, recycling centers, and industrial sites.

2.Pre-treatment: The next step is to pre-treat the waste plastics. This may involve removing any contaminants, such as metals or glass.

3.Pyrolysis: The waste plastics are then pyrolyzed in a furnace. The temperature and time of the pyrolysis process will vary depending on the type of plastic being processed.

4.Condensation: The oil vapors that are produced during pyrolysis are then condensed to form liquid oil.

5.Purification: The oil may need to be purified before it can be used. This may involve removing impurities, such as water or sulfur.

The production of oil from waste plastics is a promising technology that has the potential to reduce the amount of plastic waste that ends up in landfills and incinerators. It is also a renewable and sustainable alternative to fossil fuels.

3.4 Required Instruments

3.4.1 Instruments List:

1. Frame
2. Reactor
3. Storage Tank
4. Rotary joint
5. Gear
6. Pipe
7. Motor

3.4.1.1 Frame

A frame base typically refers to a structural support frame that serves as the foundation for a piece of equipment, machinery, or a structure. The frame base is designed to provide stability, support and a level platform for the equipment or structure it is supporting.

A frame base can be made of various materials as such as steel sheet, angle bar, bearing depending on the intended use and load capacity requirement. The design of a frame base typically considers factors such the weight and size of the equipment or structure, the type of load it will bear and the environmental conditions it will be exposed to the construction of a frame base generally involves the following step.

Determine the size and shape of the frame, considering factor such as load capacity, durability and resistance to environmental conditions. Cut and weld the frame components together to form the desired shape and size. Install any necessary brace, gussets, or cross members to provide additional support and stability.

Attach the equipment or structure to the frame base using bolts, screws, or other fasteners. Test the stability and levelness of the frame base to ensure that it can support the weight of the equipment or structure. Overall, a frame base is an essential component for many types of equipment and structure, providing a solid foundation and ensuring stability and safety. proper design and construction of a frame base and critical to the longevity and functionality of the equipment or structure it supports.

Figure3.4.1.1: Frame

3.4.1.2 Reactor

The production of oil from waste plastics typically involves a process called pyrolysis. Pyrolysis is a thermal decomposition process that breaks down organic materials, such as plastic, into smaller molecules in the absence of oxygen. Here's a general overview of how a pyrolysis reactor can be used for oil production from waste plastics:

Figure 3.4.1.2: Reactor

1. Preparing the waste plastics: The waste plastics are sorted and cleaned to remove any contaminants like paper, metal, or non-plastic materials. The plastics may also be shredded or cut into smaller pieces to increase their surface area and facilitate the pyrolysis process.

2. Loading the reactor: The prepared waste plastics are loaded into a pyrolysis reactor, which is a closed vessel or chamber designed to withstand high temperatures and pressure.

3. Heating and pyrolysis: The reactor is heated to high temperatures, typically ranging from 300 to 500 degrees Celsius (572 to 932 degrees Fahrenheit), while maintaining an oxygen-free environment. In this condition, the waste plastics undergo thermal decomposition, breaking down into various products.

4. Collection and separation: As the plastics are heated, they release gases, liquids, and solid residues. These components are collected and separated within the pyrolysis reactor. The liquid fraction obtained from pyrolysis is known as pyrolysis oil or plastic oil.

5. Cooling and condensation: The pyrolysis oil, along with other volatile gases, is cooled and condensed to convert it back into a liquid state. This step often involves passing the gases through a condenser or heat exchanger, where they are cooled by a cooling medium like water or air.

6. Fractional distillation: The condensed liquid mixture is further processed through fractional distillation, a technique that separates different components based on their boiling points. The pyrolysis oil is typically separated into various fractions, including lighter hydrocarbons resembling gasoline, diesel-like fractions, and heavier oils.

7. Additional treatment: The separated oil fractions may undergo additional treatment steps to improve their quality and remove impurities. These treatments can include filtering, deoxygenation, desulfurization, and other refining processes.

8. Product utilization: The resulting oil products can be used for various applications, such as fuel for heating, power generation, or as a feedstock for the petrochemical industry.

It's important to note that the efficiency and composition of the produced oil can vary depending on the specific pyrolysis process parameters, the type and quality of the waste plastics used, and the subsequent refining steps employed. Additionally, it is crucial to consider proper waste management practices and environmental regulations to ensure the safe and sustainable production of oil from waste plastics.

3.4.1.3 Storage Tank

After the production of oil from waste plastics through pyrolysis, the resulting oil is typically stored in storage tanks. These tanks are designed to safely store and preserve the oil until it is further processed or utilized. Here are some key points regarding the storage of oil from waste plastics:

Figure.3.4.1.3: Storage tank

1. Tank selection: The choice of storage tank depends on factors such as the volume of oil to be stored, the properties of the oil (including temperature and chemical composition), and any regulatory requirements. Common types of storage tanks for oil include steel tanks, fiberglass-reinforced plastic (FRP) tanks, and polyethylene tanks. The tank should be resistant to the specific properties of the oil and designed to prevent leakage or spills.

2. Tank design and construction: The storage tank should be constructed with materials suitable for containing the oil and preventing any environmental contamination.

   It should have a robust structure capable of withstanding the weight of the stored oil, as well as any external loads. The tank may have insulation or heating elements to maintain the oil at the desired temperature, if necessary.

3. Safety considerations: Safety features such as pressure relief valves, venting systems, and overflow protection should be incorporated into the tank design to prevent overpressure, excessive heat buildup, and potential hazards. Adequate grounding and fire safety measures should also be implemented.

4. Monitoring and maintenance: Regular monitoring and inspection of the storage tank are essential to ensure its integrity and prevent any leaks or failures. This includes checking for corrosion, monitoring oil levels, and conducting routine maintenance as per manufacturer recommendations.

5. Environmental protection: Proper containment and spill prevention measures should be in place to minimize the risk of oil spills or leaks. Secondary containment systems, such as bund walls or dikes, can be installed around the storage tank to contain any potential spills and prevent them from reaching the environment.

6. Compliance with regulations: It is crucial to adhere to local regulations and guidelines related to the storage of oil and waste plastics. These regulations may include permits, reporting requirements, and safety standards. It's important to consult with relevant regulatory bodies to ensure compliance and environmental responsibility.

7. Transfer and distribution: Depending on the subsequent use or processing of the oil, it may be transferred from the storage tank to other transportation or distribution systems. This can involve pumping or other transfer methods to move the oil safely and efficiently.

Overall, proper storage of oil from waste plastics is vital to maintain its quality, prevent environmental contamination, and ensure the safety of personnel and surrounding areas. Adhering to industry best practices and complying with regulations is essential throughout the storage process.

3.4.1.4 Rotary Joint

A rotary joint, also known as a rotary union or swivel joint, is a mechanical device that allows the transfer of fluid or gas between a stationary system and a rotating component. It provides a sealed connection, enabling the passage of fluids or gases while allowing for continuous rotation without tangling or damaging the connecting pipes or hoses.

Rotary joints are commonly used in a wide range of applications where there is a need for the transfer of media (such as fluids, gases, or compressed air) between stationary and rotating parts.

Figure 3.4.1.4: Rotary Joint

3.4.1.5 Gear

Gear is often used to describe a toothed wheel or cylinder that interacts with other gears to transmit or alter motion in machinery. Gears are commonly found in engines, vehicles, and various mechanical systems. They are used to transfer power, change rotational speed or direction, and provide mechanical advantage.

Figure 3.4.1.5: Gear

3.4.1.6 M. S Pipe

An M.S. pipe, also known as a Mild Steel pipe, refers to a type of pipe made from low-carbon steel, M.S. pipes are widely used in various applications due to their durability, strength, and affordability. Here are a few key characteristics and applications of M.S. pipes:

Figure 3.4.1.6: M.S Pipe

Characteristics of M.S. pipes:

1. Material: M.S. pipes are made from mild steel, which contains a low amount of carbon (typically less than 0.25%).
2. Strength: While not as strong as high-carbon steel pipes, M.S. pipes still possess good strength and can withstand moderate levels of stress and pressure.
3. Ductility: Mild steel has good ductility, making M.S. pipes easier to shape and weld.
4. Corrosion resistance: M.S. pipes are susceptible to corrosion, and therefore, they are often coated or protected to enhance their resistance to rust.

Applications of M.S. pipes:

1. Plumbing and water supply: M.S. pipes are commonly used for water supply systems, plumbing installations, and underground piping due to their strength and affordability.
2. Structural applications: M.S. pipes are used in the construction industry for various structural applications such as columns, beams, and supports.
3. Industrial pipelines: They are used for transporting fluids, gases, and slurries in industries such as oil and gas, petrochemicals, and manufacturing.
4. Fencing and handrails: M.S. pipes are utilized for fencing purposes, as well as for the construction of handrails and guardrails.

5. Automotive and transportation: Mild steel pipes find application in the automotive industry for exhaust systems, chassis components, and other structural parts.

It’s important to note that the specific use and specifications of M.S. pipes can vary depending on the requirements of the application.

3.4.1.5 DC Gear Motor

A gear motor is an all-in-one combination of a motor and gearbox. The addition of a gear head to a motor reduces the speed while increasing the torque output. ... Most of our DC motors can be complimented with one of our unique gearheads, providing you with a highly efficient gear motor solution. A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.

Figure 3.4.1.5: D.C Gear Motor

DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings.

Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

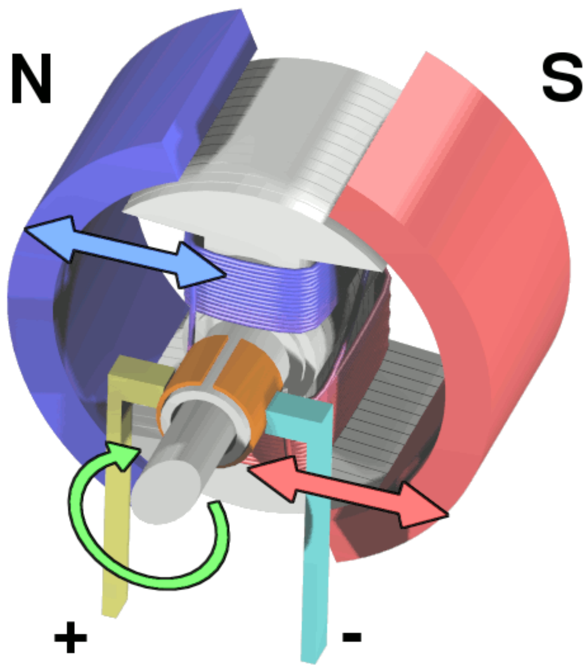

Figure 3.4.1.6: DC Motor

A coil of wire with a current running through it generates an electromagnetic field aligned with the center of the coil. The direction and magnitude of the magnetic field produced by the coil can be changed with the direction and magnitude of the current flowing through it. A simple DC motor has a stationary set of magnets in the stator and an armature with one or more windings of insulated wire wrapped around a soft iron core that concentrates the magnetic field. The windings usually have multiple turns around the core, and in large motors there can be several parallel current paths. The ends of the wire winding are connected to a commutator.

The commutator allows each armature coil to be energized in turn and connects the rotating coils with the external power supply through brushes. (Brushless DC motors have electronics that switch the DC current to each coil on and off and have no brushes.) The total amount of current sent to the coil, the coil's size and what it's wrapped around dictate the strength of the electromagnetic field created. A Direct Current (DC) motor is a rotating electrical device that converts direct current, of electrical energy,

into mechanical energy. An Inductor (coil) inside the DC motor produces a magnetic field that creates rotary motion as DC voltage is applied to its wrapped terminal. Inside the motor is an iron shaft,

in a coil of wire. This shaft contains two fixed, North and South, magnets on both sides which causes both a repulsive and attractive force, in turn, producing torque.

Rated voltage: 12 V DC

Reduction Ratios: 1:270

Direction of rotation: CW

At no load:

Speed: 10.8 ±10%rpm

Current: 0.035A (max 0.43A)

At max efficiency:

Torque: 2.4kg.cm

Speed: 9.3 ±10% rpm

Current 0.068 A (max 2.4A)

3.2.1 The final products

Diesel 80%-90% will be the final product, since waste tire, plastic oil is a special oil. It is different from underground mining. When waste engine oil is employed in refining, the item is 95%-100%. This is a standard diesel which can be employed in a application as an example in diesel engines.

Figure3.2.1: Final Project

CHAPTER 4

DATA ANALYSIS

4.1 Performance Evaluation Measures:

In this research, the performance of the fabricated waste plastic oil converter was evaluated in terms of conversion

efficiency (wt %), waste reduction efficiency (wt %), oil recovery (ml of oil/kg of plastic) and was expressed by the

following formula.

1. Conversion Efficiency (wt %)

CE $=\frac{Wo}{Wsm} \times 100\%$

Where:

CE = Conversion Efficiency

Wo = Weight of oil converted (g)

Wsm = weight of the sample material(g)

2. Waste Reduction Efficiency (wt%)

WRE $=\frac{Wsm-Wc}{Wsm} \times 100\%$

Where:

WRE = Waste Reduction Efficiency

Wc = Weight of char inside the reactor (g)

Wsm = weight of sample material (g)

3. Oil Recovery (ml/kg)

OR $=\frac{V}{Wsm}$

Where:

OR = Oil Recovery (ml/kg)

V = Volume of oil recovered (ml)

Wsm = Weight of sample material (kg)

4.2 Performance Evaluation

Parameters	Trial						Average
	1	2	3	4	5	Total	
Weight of P.P Plastic(g)	200	200	200	200	200	1000	200g
Duration of operation(2hr)	2	2	2	2	2	10	2hr
Volume of oil recovered(ml)	120	125	123	130	126	624	125ml
Weight of oil recovered(g)	125	128	126	124	130	633	126.6g
Weight of char recovered(g)	12	10	11	13	12	58	11.6g

Figure4.2: Data gathered during testing

4.3 Summary of results

Parameters	Trial						Average
	1	2	3	4	5	Total	
Conversion Efficiency (wt%)	62	64	61	62	60	309	61.8%
Waste Reduction Efficiency (wt%)	93.5	94.5	94	95.5	94.5	471.5	94.3%
Oil recovery (ml oil/g)	790	800	810	795	805	4000	800 ml/g

Figure4.3: Summary of result


Figure4.2.1: Oil and Char as an output of the equipment

Conversion efficiency is the ability of the equipment to convert waste plastic into oil in terms of weight. This is computed by dividing the weight of oil recovered by the original weight of plastic and is multiplied by 100. Based on the result of the study, the waste plastic oil converter has a 61.8% conversion efficiency.

Waste reduction efficiency is the measure of how efficient the equipment in reducing waste in terms of weight. This is calculated by subtracting the weight of char from the original weight of the plastic divided by the original weight of the plastic and is multiplied by 100. As a result of the study, the equipment showed 94.3% waste reduction efficiency.

Oil recovery is the measure of how much oil the equipment can recover per kg of waste plastic. In this study, the waste plastic oil converter was able to recover 800 ml of oil per kilogram of Polypropylene (PP)plastics.

CHAPTER 5

RESULT AND DISCUSSION

5.1 Discussion

While working on our project, we did face some difficulties as it is a very complex system but the end results, we came up with were quite satisfactory. We have put the whole system through several tasks to validate our work and also have taken necessary notes for future improvements. Some future recommendations that we have involves improvement in system design and wiring. Adding features for more efficient.

5.2 Result

The production of oil from waste plastics through pyrolysis can yield several results depending on the specific process parameters, the type of waste plastics used, and the subsequent refining steps. Here are some potential outcomes:

- Pyrolysis oil: The primary product of the pyrolysis process is a liquid fuel known as pyrolysis oil or plastic oil. This oil is a mixture of various hydrocarbon compounds derived from the decomposition of waste plastics. The composition of the pyrolysis oil can vary depending on the types of plastics processed, but it typically consists of a range of hydrocarbons, including alkanes, alkenes, and aromatic compounds.
- Gaseous byproducts: Along with pyrolysis oil, the pyrolysis process also produces gaseous byproducts. These gases can include methane, ethane, propane, butanes, and other volatile organic compounds. The exact composition and quantity of gases produced will depend on the pyrolysis conditions and the specific waste plastics being processed.
- Solid residues: After the pyrolysis process, solid residues are left behind in the reactor. These residues, often referred to as char or carbon black, contain carbon and various inorganic materials that were present in the waste plastics. The char can be further processed and used as a solid fuel or as a source of carbon black for applications such as tire manufacturing or pigment production.
- Byproduct gases and liquids: In addition to the main products mentioned above, there may also be smaller quantities of other byproduct gases and liquids generated during the pyrolysis process. These byproducts can include water, light hydrocarbons, and other volatile organic compounds that may have formed as a result of secondary reactions or impurities in the feedstock.

It's worth noting that the quality and properties of the pyrolysis oil obtained from waste plastics can vary. The composition, energy content, and stability of the oil may require further refining and upgrading to improve its suitability as a fuel or feedstock. The refining processes can involve removing impurities, adjusting the viscosity, and enhancing the fuel properties of the pyrolysis oil to meet specific requirements.

CHAPTER 6

CONCLUSION

6.1 Advantage

The production of oil from waste plastics through processes like pyrolysis offers several advantages:

1. Waste management and environmental benefits: Converting waste plastics into oil helps address the growing problem of plastic waste accumulation. By diverting plastics from landfills or incineration, it reduces the environmental impact associated with plastic disposal, including the release of greenhouse gases and the potential for land and water pollution.

2. Energy recovery: Waste plastics contain valuable carbon-based energy, and converting them into oil allows for the recovery of this energy. The produced oil can be used as a substitute for conventional fossil fuels, reducing the demand for non-renewable resources and contributing to energy diversification.

3. Resource conservation: By recycling and reusing waste plastics as a feedstock for oil production, the need for new fossil fuel extraction and refining can be reduced. This helps conserve natural resources and minimizes the environmental impacts associated with traditional fuel production processes.

4. Versatile fuel source: The pyrolysis oil obtained from waste plastics can be utilized as a fuel in various applications. It can be used for heating, power generation, or as a feedstock for further refining to produce transportation fuels, such as gasoline, diesel, or jet fuel.

5. Reduced carbon footprint: The production of oil from waste plastics can contribute to reducing greenhouse gas emissions. By utilizing plastic waste as a feedstock and displacing the use of conventional fossil fuels, it helps mitigate carbon dioxide emissions that would otherwise be released through the extraction, refining, and combustion of traditional fuels.

6. Economic opportunities: Waste plastic-to-oil technologies can create new economic opportunities and industries. The recycling and conversion of waste plastics into valuable products, such as oil, can stimulate job creation, promote entrepreneurship, and contribute to local and regional economies.

It's important to note that while the production of oil from waste plastics offers advantages, there are also challenges and considerations to address. These include the need for efficient and environmentally sound pyrolysis technologies, proper management of any byproducts or residues, ensuring the quality and safety of the resulting oil, and creating a sustainable market demand for the produced oil. Additionally, continuous efforts in waste reduction, recycling, and the development of more sustainable plastic alternatives remain crucial in addressing the broader issue of plastic waste.

6.2 Application

The oil plant is employed to produce crude oil, this diesel is employed in burner, generators, farm machinery and heavy industrial equipment. In modern diesel engine it is used when blended with Petrol-diesel 30%-50%. However, if waste engine oil can be used in refining. The product is standard diesel that you can use in an application.

6.3 Conclusion

To conclude, the effect for the environment of waste oil to diesel distillation plant is a positive impact.

The squander can destroy environmental surroundings because they are non-degradable. Therefor the oil plant removes this waste by recycling them.

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