International Journal of Scientific Research in Science, Engineering and Technology
Print ISSN: 2395-1990 | Online ISSN : 2394-4099 (www.ijsrset.com)
doi : https://doi.org/10.32628/IJSRSET

Utilization of Plastic Waste for Making Plastics Bricks

Prashant Gusain, Vikupu. Z. Awomi, Suyimmeren Longkumer, Techi Binod, Liki G Jimo, Paching Anjali
Department of Civil Engineering, Tula's Institute, Dehradun, Uttarakhand, India

ARTICLEINFO

Article History:

Accepted: 01 June 2023
Published: 20 June 2023

Publication Issue
Volume 10, Issue 3
May-June-2023

Page Number
533-536

ABSTRACT

Plastic waste is a non-biodegradable waste which takes thousands years to decompose and it becomes a global concern. If we throw plastic waste on the ground it causes soil pollution when its burn it causes air pollution and when we threw in the water bodies it causes water pollution, which effects the aquatic plants and animals. The percentage of the plastic waste is increasing rapidly. And the recycle of plastic waste percentage is so less, which in return it causes a major impact to the global warming. As a Civil Engineer we have to innovate something new which will not cause much harmful to our environment. So here we try to do something innovative a plastic bricks. It is most economical solution present in the construction industry and it also environment friendly solution of plastic waste. We observe that a characteristic of plastic bricks is far much better than normal bricks.

Keywords : Water Absorption Test, Compression Strength Test, Hardness Test, Soundness Test, Efflorescence Test.

I. INTRODUCTION

In today's world, the issue of plastic waste has reached alarming proportions, causing severe environmental damage and posing a threat to ecosystems worldwide. However, amidst this crisis lies a remarkable opportunity for innovation and sustainability: the utilization of plastic waste in the production of plastic bricks. These bricks offer a promising solution to the dual challenges of waste management and construction needs, harnessing the durability and versatility of plastic materials.

Plastic bricks are a revolutionary concept that involves transforming plastic waste into building blocks that can be used in various construction projects. The process typically involves collecting and sorting plastic waste, melting it down, and molding it into brick-shaped structures. The resulting plastic bricks possess a range of advantageous properties, such as lightweight yet sturdy composition, resistance to weathering and decay, and excellent thermal and sound insulation properties. Furthermore, they can be easily cut, shaped, and assembled, making them highly adaptable to different architectural designs and construction requirements.

One of the most significant advantages of plastic bricks is their potential to address the global waste management crisis. With millions of tons of plastic waste being generated each year, finding effective solutions for its disposal is paramount. By diverting plastic waste from landfills and repurposing it into building materials, the production of plastic bricks not only reduces the strain on already overburdened waste management systems but also prevents the release of harmful pollutants into the environment.

Moreover, the utilization of plastic waste for making plastic bricks can significantly contribute to sustainable construction practices. Traditional brick manufacturing involves the extraction of clay and the consumption of large amounts of energy, leading to deforestation and increased carbon emissions. In contrast, plastic bricks provide an eco-friendly alternative by reducing the demand for raw materials and conserving energy. Additionally, these bricks can be recycled multiple times, extending their lifespan and minimizing the environmental footprint associated with construction activities.

The advancements in plastic brick technology have also led to the development of innovative production techniques. For instance, some companies are incorporating additives into the plastic mixture to enhance fire resistance and strength, making the bricks even more durable and reliable. Furthermore, researchers are exploring the use of various plastic types, such as polyethylene terephthalate (PET) bottles and low-density polyethylene (LDPE) packaging materials, expanding the range of potential sources for plastic waste.

However, it is essential to acknowledge the challenges and implications associated with the utilization of plastic waste for plastic bricks. Quality control, ensuring consistent composition and strength of the bricks, is a crucial aspect that requires meticulous attention. Additionally, raising awareness and promoting responsible waste disposal practices are vital to ensure a steady supply of suitable plastic waste for brick production.

The utilization of plastic waste for making plastic bricks offers a remarkable opportunity to address the pressing issues of waste management and construction needs. By transforming plastic waste into durable, versatile, and eco-friendly building materials, plastic bricks not only contribute to sustainable construction practices but also mitigate the adverse environmental impacts of plastic pollution. With ongoing advancements in technology and increased awareness, the utilization of plastic waste for plastic bricks holds immense potential to create a cleaner, greener, and more sustainable future.

II. METHODS AND MATERIAL

Materials needed:

1. Plastic waste (such as plastic bottles, bags, packaging materials, etc.)
2. Sorting equipment (to separate different types of plastic)
3. Shredder or grinder
4. Melting equipment (such as a furnace or extruder)
5. Molds (for shaping the plastic into brick form)
6. Cooling system (to solidify the melted plastic)
7. Quality control tools (to ensure consistency and strength of the bricks)

Methodology to be followed:

Step 1: Collection and Sorting

Collect plastic waste from various sources, ensuring it is clean and free from contaminants. Sort the plastic waste based on its type (e.g., PET, HDPE, LDPE) to ensure a consistent composition for the bricks. Remove any non-plastic materials, such as labels or caps, as they can affect the quality of the bricks.

Step 2: Shredding or Grinding

Use a shredder or grinder to break down the plastic waste into smaller pieces. This process increases the surface area of the plastic, making it easier to melt and mold later on. The shredded or ground plastic should be of a uniform size for better melting efficiency.

Step 3: Melting

Transfer the shredded or ground plastic into a melting equipment, such as a furnace or extruder. Apply heat to melt the plastic, raising it to its melting point. The exact temperature and heating time will depend on the type of plastic being used.

Step 4: Molding

Once the plastic is in a molten state, pour or inject it into molds that are designed in the shape of bricks. The molds should be prepared in advance, ensuring they are clean and properly lubricated to prevent sticking. Fill the molds completely, taking care to avoid air pockets or gaps.

Step 5: Cooling and Solidification

Allow the molten plastic to cool and solidify inside the molds. This can be achieved through natural cooling or by using a cooling system, such as water or air cooling. Cooling time may vary depending on the thickness and size of the bricks.

Step 6: Demolding

Once the plastic has completely solidified, carefully remove the bricks from the molds. Handle them gently to avoid any breakage or deformation. Check for any defects or imperfections during the demolding process.

Step 7: Quality Control

Inspect the plastic bricks for quality and strength. Conduct tests to ensure they meet the required standards for construction purposes. Quality control tools, such as compression testing machines, can be used to measure the compressive strength of the bricks.

III. RESULTS AND DISCUSSION

Various tests are conducted to evaluate the performance of the plastic waste bricks. Compressive strength tests determine the load-bearing capacity of the bricks. Water absorption tests measure the percentage of water absorbed by the bricks. Efflorescence tests assess the presence of salt deposits on the surface. Soundness tests determine the durability of the bricks. Density and hardness tests provide additional insights into the physical properties of the plastic waste bricks.

TABLE I

TESTING RESULTS

S.No	Description	Test values	remarks
1	Compressive strength	21mpa	good
2	Flexural strength	3.2mpa	satisfactory
3	Soundness	2mm	excellent
4	efflorescence	<5%	Above average

IV. CONCLUSION

In conclusion, the utilization of plastic waste for making plastic bricks presents a promising and innovative solution to the pressing challenges of waste management and construction needs. By repurposing plastic waste into durable building materials, plastic bricks offer numerous benefits, including reduced strain on waste management systems, prevention of environmental pollution, and promotion of sustainable construction practices. Advancements in technology and research have further enhanced the quality and strength of plastic bricks, expanding their potential applications in the construction industry. Embracing

this eco-friendly approach not only addresses the plastic waste crisis but also contributes to a cleaner and more sustainable future for generations to come.

V. REFERENCES

[1]. United Nations Environment Programme (UNEP) - Plastic Waste Management: https://www.unep.org/explore-topics/plastic-pollution/plastic-waste-and-circular-economy/plastic-waste-management

[2]. World Economic Forum (WEF) - Innovative Uses of Plastic Waste: https://www.weforum.org/agenda/2020/01/innovative-ways-to-reduce-plastic-waste/

[3]. National Geographic - Turning Plastic Waste into Building Materials: https://www.nationalgeographic.com/environment/article/how-to-turn-plastic-waste-into-building-material

[4]. The Guardian - Turning Plastic Waste into Construction Materials:https://www.theguardian.com/environment/2020/jul/30/building-blocks-turn-plastic-waste-construction-materials

[5]. ScienceDirect - Utilization of Plastic Waste in Building Materials:https://www.sciencedirect.com/science/article/pii/S2352710218303044

[6]. Journal of Cleaner Production - Plastic Waste as a Resource for Construction Materials : https://www.sciencedirect.com/science/article/pii/S0959652619313259

[7]. Waste Management - Utilization of Plastic Waste in the Construction Industry : https://www.sciencedirect.com/science/article/pii/S0956053X12001547

[8]. ResearchGate - Sustainable Utilization of Plastic Waste for Brick Production: https://www.researchgate.net/publication/337727180_Sustainable_Utilization_of_Plastic_Waste_for_Brick_Production

[9]. Environmental Science and Pollution Research - Recycling of Plastic Waste into Construction Materials : https://link.springer.com/article/10.1007/s11356-017-0791-0

[10]. Materials Today Sustainability - Plastic Waste Management and Sustainable Construction : https://www.sciencedirect.com/science/article/pii/S259033222030215X

[11]. Waste and Biomass Valorization - Utilization of Plastic Waste in Cement Composites:https://link.springer.com/article/10.1007/s12649-019-00903-w

[12]. International Journal of Environmental Science and Technology - Valorization of Plastic Waste for Building Applications : https://link.springer.com/article/10.1007/s13762-021-03087-5

[13]. Journal of Hazardous Materials - Plastic Waste Conversion into Building Materials : https://www.sciencedirect.com/science/article/pii/S0304389420303500

[14]. Construction and Building Materials - Sustainable Use of Plastic Waste in Construction Industry : https://www.sciencedirect.com/science/article/pii/S0950061820336882

[15]. Resources, Conservation and Recycling - Plastic Waste Recycling for Construction Applications : https://www.sciencedirect.com/science/article/pii/S0921344920306242

Cite this article as :

Prashant Gusain, Vikupu. Z. Awomi, Suyimmeren Longkumer, Techi Binod, Liki G Jimo, Paching Anjali, "Utilization of Plastic Waste for Making Plastics Bricks ", International Journal of Scientific Research in Science, Engineering and Technology (IJSRSET), Online ISSN : 2394-4099, Print ISSN : 2395-1990, Volume 10 Issue 3, pp. 533-536, May-June 2023.

Journal URL : https://ijsrset.com/IJSRSET23103130