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STUDY AND ANALYSIS OF BUILDING BRICKS MADE BY PLASTIC WASTE AND GLASS WASTE

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Abstract -The main objective of this research work is to use waste plastic effectively which is a major objective of maintaining ecological balance and reducing plastic waste. The bad effects of plastic waste are felt worldwide. Therefore, to solve this problem, try to reduce it. In our day- to-day life, we use many different types of plastic bags. These bags also descend into rivers and drains and eventually merge into the sea, which also pollutes water bodies. The polymer chain of polyethylene is brittle and bursts when exposed to ultraviolet radiation from sunlight. This suggests that the plastic bags will eventually split into microscopic granules. However, scientists do not know how many centuries it takes for the Sun to play its magic. The main scope of the present study is that the cost of bricks is minimal, in addition the properties of bricks waste plastic and fly ash can be used. The amount of damage caused by this is irreparable. In landfills it is growing as waste from various forms. Because of the devastating effects plastics have on human life, environmentalists are constantly working to find a solution to the problem of plastic disposal.

***Key Words*:**waste plastic, waste glass powder, compressive test, water absorption, cost analysis.

1.INTRODUCTION

The main objective of this research work is to use waste plastic effectively which is a major objective to maintain ecological balance and reduce plastic waste. The bad effects of plastic waste are felt worldwide. So, to resolve this issue, try to reduce it. In our day-to-day life, we use many different types of plastic bags. They are usually used only once a day, then they are thrown into the garbage. Thin plastic bags usually represent a serious ecological problem because they cannot be easily recycled. According to one study, it is estimated that plastic bags take about 500 years of exposure to sunlight. If it is not exposed to sunlight, it can remain in our environment indefinitely and it will prove to be a curse for the environment. Plastics range from milk bags, salt packing bags, grocery packaging, vegetable packaging to the items we buy, all come in plastic which ensures their freshness, hygiene, health, safety, etc. But where do these bags go when we throw it away. Thin plastic bags are usually used only once! These thin plastic bags are causing great harm to the environment, and are a serious ecological problem. The decomposition of these plastic bags is a major issue and threat to the future. The weight of these bags is very light and they bounce easily from the air and we can convert many places to plastic area. These bags also descend into rivers and drains and eventually merge into the sea, which also pollutes water bodies. The polymer chain of polyethylene is brittle and bursts when exposed to ultraviolet radiation from sunlight. This suggests that the plastic bags will eventually split into microscopic granules. However, scientists do not know how many centuries it takes for the Sun to play its magic. Similarly, waste plastics are produced in large quantities due to an increase in population and due to environmental problems when transported for disposal, causing heavy and severe environmental pollution problems near thermal power plants. Andean will help to a great extent in controlling environmental pollution. In the hope of better quality and environmentally friendly nature, there has been an increase in government support for the demand for fly ash bricks. The main scope of the present study is that the cost of bricks is minimal, in addition the properties of bricks waste plastic and fly ash can be used. The amount of damage caused by this is irreparable. In landfills it is growing as waste from various forms. Because of the devastating effects plastics have on human life, environmentalists are constantly working to find a solution to the problem of plastic disposal..

2. OBJECTIVES OF THE PRESENT WORK

The main objective of this review is to determine the suitability of waste voltaic bottles, pvc, waste glass, plastic waste polyethylene bags in the development of building bricks for construction.

- To reduce plastic waste and waste glass.
- Use of plastic waste material and waste glass in manufacturing method.
- Reducing the environmental and ecological challenge associated with plastics.
- To find alternatives to basic materials that are used in building bricks.
- To reduce the consumption of earth-based materials in the form of clay for brick manufacturing resulting in resource degradation, environmental degradation.
- Reducing the amount of waste plastic on land and water to avoid land and water pollution.
- To reduce the dumping area of waste plastic and waste glass

3. LITERATURE REVIEW

This chapter deals with the basic principle related to plastic waste and glass waste that can be used as a production of building brick. Various literature reviews conducted by previous researches are discussed below.

RajarapuBhushaiah (2019), Waste plastic that is available everywhere can be placed in brick for an effective use. Plastic bricks can help reduce environmental pollution, which will make the environment cleaner and healthier. Plastic sands reduce the use of clay in making bricks. Plastic sand

bricks give customers an alternative choice of bricks at cheaper rates. Water absorption of plastic and sand brick is zero percent because plastic and sand brick do not absorb water. The compressive strength of plastic sand brick is 5.6 N / mm2 at a compressive load of 96KN. We conclude that plastic sand bricks are useful for the construction industry when we compare them with fly ash bricks and third grade clay bricks.

Nikhil Shindeet .al (2018), In our day-to-day life we come with many different types of plastic bags. Generally they are used only once and then thrown away. Especially thin plastic bags represent a serious ecological problem because they cannot be easily recycled. According to one study, it is estimated that plastic bags take about 500 years after exposure to sunlight. If it is not exposed to sunlight, it can remain in our environment for an indefinite period of time. This brick is resistant to oil, water, salts, acids and alkalis. It can withstand a pressure of 6.31 N / mm2. This may be an effective method of recycling waste plastic bags in the near future. This brick is made of plastic so no effect of oil, salts and acids is seen. It is less porous for water. It can withstand a compressive strength of 6.31 N / mm2. It does not extend too much overheating. Its construction cost is less as compared to normal pavement blocks Rs 5 per brick. Gases are emitted while heating the plastic in the open. As a solution, we can melt these plastic bags in a microwave oven at 150–160 ° C. In the microwave, there is no air supply, so there is no gas emission. Also, a constant temperature can be maintained. It emphasizes against heat and electricity.

R.Mahadevi1 et.al (2018), Concrete paver block is a better option in road construction when compared to conventional road which is made by bitumen and gravel. As India is a developing country, the construction of roadways and buildings plays an important role. . The purpose of this research is to reduce unit weight, block costs, and environmental pollution. Disposal of plastic in the environment is considered a major problem due to its low bio- capacity and large amount of presence. PVC plastic is used as a partial replacement of 0, 10 and 30 as a partial replacement in m-sand in powder form. Using197x167x61mm bone- shaped paver block molds and M30 grade of concrete mixes are used. Compression and water absorption tests are performed.

Manish Kumar Sahu et.al (2017), In recent times there has been considerable imbalance between the availability of traditional construction materials and their demand. Laterite mine waste is available in abundance and disposal of waste plastics is one of the biggest challenges, as repeated recycling of PET bottles poses a potential risk of conversion to a carcinogenic material and only a small proportion of PET bottles are recycled. Is going. Despite expensive traditional recycling techniques, there has been increased demand for more scientific and innovative techniques to effectively recycle these materials. It uses the paper manufacturing process and the plastic sand brick test method.

Mr.N.Thirugnanasambantham (2017), Plastic sand brick has more advantages including cost efficiency, resource efficiency, emission reduction of greenhouse gases, etc. Plastic sand bricks are also called "eco-bricks" made of plastic waste that may otherwise be harmful to all living organisms. Used for construction purposes. This increases the compressive strength compared to fly ash bricks. By the use of plastic sand bricks, the water absorption presence of alkali was highly reduced. Further research will improve the quality and durability of plastic sand bricks due to its many advantages.

4. MATERIALS AND THEIR PROPERTIES

Basic Ingredients Properties

- Cement (PPC)
- Lime
- Waste Glass
- Fly Ash
- Sand
- Plastic Waste
- Water

Cement (PPC)

Portland Pozzolana Cement is integrated cement made by synthesizing OPC cement with pozzolanic materials in a fixed ratio. It is commonly referred to as PPC cement. Pozzolana is a volcanic powder found near Vesuvius in Italy. A pozzolanic material may be a natural or synthetic material containing silica and aluminous in a reactive form. This material usually has no cement properties, but when mixed with water or moisture or undergoes a reaction with calcium hydroxide to form compounds with cement properties Pozzolana, also known as Pozzolanic ash, is a volcanic ash. Vitruvius speaks of four types of pozzolana -black, white, gray, and red, all of which can be found in volcanic regions of Italy.

Lime

Lime is one of the basic construction materials used primarily in lime mortar. The broad range of lime is non-hydraulic and hydraulic lime. Non-hydraulic lime is called as quick lime, fat lime or white lime or lump lime. The hydraulic lime set is set under water and the non- hydraulic lime sets are not set under water. Quick lime is a form of lime formed by the burning of stone that contains calcium carbonate. The burning temperature varies, say 900°C and above for several hours. This process is called calcination.

Glass Waste

Glass is a product of the super coiling of a molten liquid mixture consisting mainly of sand (silicon dioxide) and soda ash (sodium carbonate) in a hardened state, in which the super cooled material is not crystallized and the molten organization and interior. The structure maintains a liquid. . When waste glass is crushed to a particle size similar to sand, similar to natural sand, it exhibits the properties of a composite material. Over the past decade, there have been widespread efforts to recover post concourse glass.

Fly Ash

Fly ash is a fine powder which is a by-product of burning coal in power generating power plants. a substance consisting of aluminous and siliceous materials that form cement in the presence of water. When used in concrete mixes, fly ash improves the strength of concrete and makes it easier to pump. Fly ash can be used as a major material in many cement-based products such as cement, concrete blocks, and brick. One of the most common uses of fly ash is Portland cement concrete pavement.

Sand

Sand is an important engineering material. Sand is mainly used as a fine aggregate in concrete works. Sand is a form of silica and according to its composition, can be siliceous. Natural sand is formed by weathering of rocks and are of different sizes or grades depending on the intensity of weathering. Sand grains can be sharp, angular or round. Sand is a mixture of small grains of rock and granular material defined mainly by size, which is finer than fine than silt and gravel.

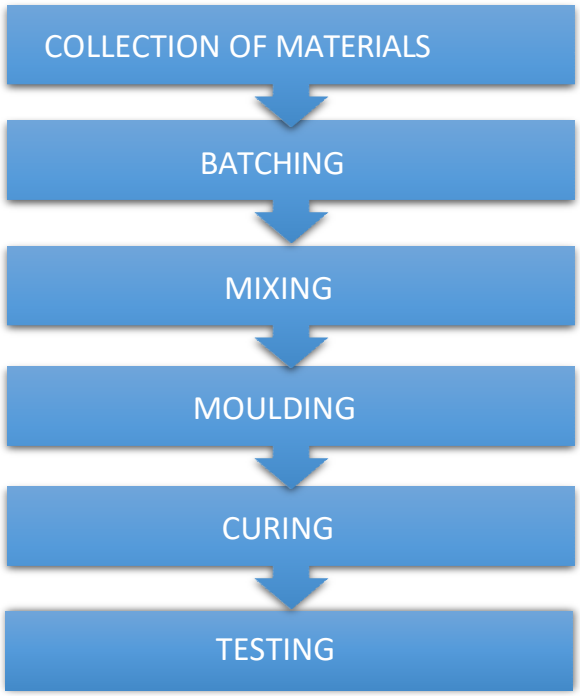
Plastic Waste

Plastic is a general term for a wide range of synthetic or semi-synthetic organic amorphous solids derived from oil or natural gas. The word 'plastic' is derived from the Greek word 'plasticos' which is suitable for moulding and 'plasticos' means moulded. A plastic in polymer chemistry, plastic has become an essential part of our daily lives. It is the cornerstone of waste management and promotes ecological balance through conscious human behaviour and choices. It should be followed that it contains a mixture of biodegradable as well as non-biodegradable substances

Water

Water is the most important component for brick production and is also the least expensive. The purpose of using water is to cause hydration of cement. The amount of water has to be carefully controlled during the brick being manufactured. The water used for mixing and treating bricks shall be clean and free of oils, acids, alkalis, salts and organic materials or other substances which may be harmful to the bricks. The pH value of the water will not be less than 6 as the pH is between 6.0 and 8.0, possibly even 9.0.

5. EXPREMENTAL WORK



COLLECTION OF MATERIALS

Waste plastic powder is a powder made in factories by cutting waste PVC plastic which is collected from the junkyard. Source of waste plastic powder in New Junkyard from Bhopal. They supply plastic powder by scraping waste plastic. Waste glass powder is a powder made in factories by grinding waste glass which is collected from the junkyard. Source of waste plastic powder in New Junkyard from Bhopal. Other materials like lime, fly ash, sand, cement were collected from the local shop of building materials in Bhopal. The glass waste that was collected could not be used directly. Before mixing with other ingredients, the glass was converted to a powder size of less than 75 microns.

BATCHING

The measurement of material for brick making is called batching. The use of a weight system in batching allows for accuracy, flexibility, and simplicity. Collected and then loaded all materials such as fly ash, lime, cement, waste glass powder, plastic waste powder and sand. The table showsthe batching ratio of the material.

SAMPLE NAME	CEMENT	LIME	GLASS WASTE	FLY ASH	SAND	PLASTIC WASTE
A	35%	5%	5%	25 %	20 %	10%
B	35%	5%	5%	25 %	15 %	15%
C	35%	5%	5%	25 %	10 %	20%
D	35%	5%	5%	25 %	5%	25%

MIXING

The mixture of materials is necessary for the production of uniform and reinforces the brick. The mixture must ensure that the mass becomes homogeneous, uniform in color and uniformity.

MOULDING

The mixture is then poured into a brick mold and compacted using a tamping rod or steel rod. The surface is finished using a trowel. Before placing the mixture in the mold, the edges of the mold are applied to remove bricks easily. Mold removed after 24 hours. Mold is used to prepare the brick in the same

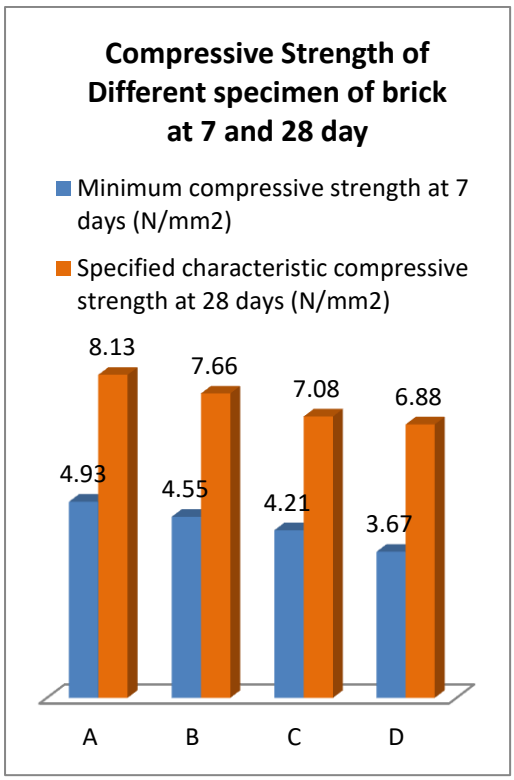
shape. The size of the mold is190 × 90 × 90 mm. The mold was assembled and placed on a base plate. The mold must be.

CURING

After compaction the test specimens were allowed to dry for a period of 24 hours. The specimens were kept in simple tanks and allowed to cure for periods of 7, 14 and 28 days.

TESTING

Compressive Strength Test



6. RESULT AND DISCUSSIONS

Compressive strength

From the compression test, it can be seen that these bricks achieved 8.13 N / mm2. These bricks resisted corrosive strength of more than 206.6% as compared to conventional clay bricks. Traditional clay brick shows a maximum compressive strength of 2.58 N / mm2. The compressive strength of brick is much higher than that of traditional clay brick. The difference in strength between the two bricks is 5.55 N / mm2.

Water Absorption

The water absorption of these bricks was 12.56%. This was less than 45.45% of the traditional clay bricks. Conventional brick was found to have 22.42% water absorption. Traditional clay bricks absorb more water while these bricks absorb less water. The water absorption difference between traditional clay brick and fly ash-based glass-plastic brick is 9.86%. According to IS 3495-Part 2 the water absorption of brick should not exceed 20%. As we know, this brick satisfies the recommendation made by IS 3495-Part 2.

Cost

These bricks were compared to the traditional bricks available in the market. Based on the May 2020 market value, the rates of traditional clay bricks were Rs.5500 / - and the rates for these bricks were Rs.4750 / - per 1000 bricks. A traditional brick costs Rs.5. Is 5. It one brick cost Rs. 4.75. Which is less than the market price of traditional brick

7. CONCLUSIONS

Based on the results obtained, the compressive strength does not differ from the fixed relationship with the percentage of plastic, so we conclude that sample A is the most appropriate.

1. The carrying capacity of glass-plastic brick is 218.6% higher than that of conventional brick. But glass-plastic brick can withstand load beyond the final level. So it can be suitable in framed structure.
2. Water absorption of glass-plastic brick is 12.23% which is lower than conventional clay brick and satisfies the IS code recommendation (IS 3495 Part-2).
3. It has been clearly concluded that fly ash based glass-plastic building bricks can be used to construct exterior walls, partition walls, composite walls, basements, etc.

8. FUTURE SCOPE

The following are the future scopes of the present study:

1. Various other wastes from industries can be used in the construction industry, in order to control the pollution generated by these wastes on our environment.
2. Plastics waste and Glass waste can be used in other construction materials such as bricks and road materials.

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BIOGRAPHIES

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