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Sustainable Concrete Development Using the Plastic Bottle Waste

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Abstract:

This report outlines the utilization of plastic waste in construction industries. Waste plastic is a non-bio-degradable substance which takes thousands of years to decompose that creates land as well as water pollution to the environment. The quantity of plastic waste is expanding rapidly. It is estimated that the rate of usage is double for every 10 years. The Plastic usage is large in consumption and one of the largest plastic wastes is polyethylene (PE). The utilization of earth-based clay material resulted in resource depletion and environmental degradation.

Key Words: Plastic, waste, utilisation, usage.

1. Introduction

Concrete is a basic material for civil engineering construction. All basic ingredients of concrete are natural. But the properties of concrete can be change by adding some plastic fiber. The concrete has many advantageous properties such as good compressive strength, durability, specific gravity and fire resistance but tensile strength of the concrete is very much low means it can be neglected. But tensile property of the concrete can be increase by addition of plastic fiber. Research conducted for this to utilization of plastic bottles of various brands like Bislery etc

2. Objectives

1. Primarily plastic waste disposal problem from industry, factory etc is reduce since it isusually disposal off in open land.

2. Reduce plastic waste by recycling PET bottles into a construction material.

3. Investigate if the addition of PET bottle pieces enhances the strength and durability of concrete.

4. 4. Determine if using PET bottle pieces can reduce the

5. overall cost of concrete production.

6.

3. Literature Review

The researchers found that in this era of Global Warming, the increase in plastic waste has become a major concern in our society. The influence of plastic wastecan be minimized by using them in the concrete. The plastic can lead to the increment in the strength of the mix.

3.1 Future scope

Environmental Impact: Further studies can explore the long-term environmental impact of using plastic in concrete, including its effectiveness in reducing plastic waste and lowering carbon emissions compared to traditional concrete production.

4. Testing of Raw material

4.1 Consistency of Cement:

1. Water for standard consistency (P) is water required for attaining standard consistency = (0.85 P) = 0.85×140 = 120 ml.

2. Water to be added 0.85 P =120ml

4.2 Initial and final setting time:

1. Time when initial setting time needle reaches for penetration up to 5 to 7 mm from bottom of mould (T2) = 30min

2. Time when final setting time needle makes an impression but the attachment fails To do as (T3) = 10 hours

Sample Calculations:

A) Consistency of cement

% of water added = 35% water added

B) Initial setting time

Intial Setting time = T2 -T1 = 30 – 0 = 30 min

C) Final setting time

Final setting time = T2 -T1 = 10 – 0 = 10 hours

5. Results

A) Consistency of cement = 35% water added

B) Initial setting time = 30 min

C) Final setting time = 10 hour

6. Conclusion

After studying the several test results of different specimens ranging in waste plastic bottle pieces (PET) content from 1% & 3% add as fibre, the following conclusions are deduced:

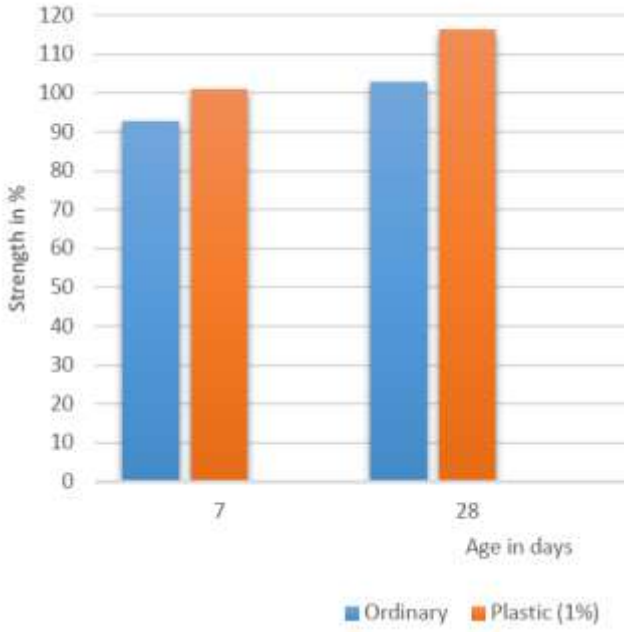
a. Increase the compressive strength of concrete, it reduce the crack formation occurs in concrete.

b. Due to adding of waste plastic bottle pieces in concrete, it is the lightweight than ordinary block.

c. Reduction of the waste generate from the industry, factory etc. thus, concrete is ecofriendly.

d. The project demonstrates that concrete mixed with waste plastic PET bottle pieces can maintain or even enhance the strength and durability of the concrete.

Fig -1: PET bottle Crush



Graph 1. Plastic Block(1%) Graph

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