



Influence of Glass Powder on the Properties Of Concrete

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Abstract—Glass is commonly used in building / construction industries and large amount of glass is powdered daily. The disposal of waste glass is an environmental issue as waste glass causes disposal problem.

Today the construction industry is in need of finding cost effective materials for increasing the strength of concrete structures. Glass powder finer than 600 μ is reported to have pozzolanic behaviour. An attempt is made to investigate the possibility of using the waste glass powder as the partial replacement of ordinary Portland cement in concrete. Concrete with replacement of cement by waste glass powder such as 5%, 10%, 15% and 20% were produced and properties of this concrete has been compared with concrete of control mix with no replacement.

Cube specimens of 24 numbers were cast, cured and tested for 7 day and 28 days strength. Compression test was conducted and the results were compared. The findings revealed an increase in compressive strength with the increase in the replacement of cement by glass powder. To reduce the demand for cement, glass powder replacements can be adopted. The replacement of glass powder decreases the unit weight as well as the porosity as indicated by the decrease in water absorption. It reduces the quantity of cement to be used in concrete. Also glass powder is proved to be economical and is considered as environmental friendly construction material.

Keywords— Glass powder, solid waste, compressive strength, curing, replacement of cement, cost effective material.

I. INTRODUCTION

Due to global warming the need to cut down energy consumption has increased. The effect of global warming has impacted everyone on the planet and is a well recognised concept¹.

The interest of construction community in using waste or recycled materials in concrete is increasing because of the emphasis placed on sustainable construction. Presently the waste glass in and around the small shops is packed as a waste and disposed as landfill⁴.

Waste glass contain high silica (SiO₂) i.e. 72%. Waste glass when ground to very fine powder (600 micron) reacts with alkalis in cement (pozzolanic reaction) and cementitious product that help contribute to the strength development².

II. OBJECTIVES OF THE INVESTIGATION

Experiments were conducted on concrete prepared by partial replacement of cement by waste glass powder of particle size 600 micron and downwards.

The main objective of this investigation was to evaluate the effect of waste glass powder on the compressive strength and the other properties of concrete and to evaluate the possibility of using glass powder in concrete without sacrificing the strength. The following were also considered.

- Partial substitute for the ordinary portland cement
- To investigate the structural behaviour of such replaced concrete components
- To determine the percentage of glass powder which gives maximum strength when compared to control concrete

III. EXPERIMENTAL PROCEDURE

A. Materials used

Ordinary Portland cement of 53 grade is used in the experiment. Sand of particle size 4.75 mm downwards coarse aggregate of 20 mm and glass powder of size 600 micron downwards is used in the experimental work.

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