

The Use of Lime Sludge as Partial Replacement of Cement in Concrete

Riyaz *, Abdul Hafiz P P ,Saheel P

Department of Civil Engineering, Dhaanish Ahamed Institute of Technology, Coimbatore, Tamil Nadu, India

Abstract

The increased demand of drinking water and paper has led huge generation of water treatment plant residue and deinking process i.e. sludge. Large quantities of sludge are produced in India and disposed off by landfilling or dumping in and around sites. In this study water softening sludge (lime sludge) has been utilized in mortar. Two grades of M20 and M25 grades are adopted with three binder combination have been tried. i.e for each grade of concrete 5%,10% and 15% of replacement cement with lime sludge. The effect of various combinations on strength has been discussed here. This paper outlines the percentage replacement of the lime sludge, method of preparation of mortar specimen, testing procedure salient results thereof.

Keywords; Lime Sludge, Mortar.

Introduction

Concrete is a very popular and widely used construction material around the world including India. In order to make concrete industry sustainable, the use of waste materials in place of natural resources is one of the best approaches. Paper mill sludge is a major economic and environmental problem for the paper and board industry.

Large quantity of lime sludge is generated all around the world. Lime sludge is generated from paper, acetylene, sugar, fertilizer, sodium chromate, soda ash industries, and water softening plants. Approximately 4.5 million tons of sludge in total is generated annually from these industries. Lime sludge behaves like cement, because of silica and magnesium properties. The silica and magnesium improve the setting of concrete. It is good in Calcium Oxide content. Due to cement production greenhouse gases are emitted in the atmosphere. For producing 4 million ton of cement, 1 million ton of greenhouse gases are emitted.

Objectives

To investigate the feasibility of lime sludge as Supplementary Cementitious Materials (SCM).

To find the influence of lime sludge on the strength on concrete made with different cement replacement levels.

Comparison of cost of nominal mix concrete and lime sludge concrete.