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T. VenuMadhav, I.V. Ramana Reddy, Vaishali G. Ghorpade, S. Jyothirmai

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COMPRESSIVESTRENGTH STUDY OF GEOPOLYMER MORTAR USING QUARRY ROCK DUST

T.VenuMadhav*, Dr.I.V.Ramana Reddy, Dr.Vaishali G Ghorpade,S.Jyothirmai
 *Associate professor & Head Department of Civil Engineering, Audisankara college of Engineering
 &Technology,Gudur-524101, Andhra Pradesh,India
 Telephone:+91-9440879958

Corresponding Author's Email: vtmadhav@gmail.com

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Abstract: India is one of the Developing countries that needs to face the environmental pollution. We have many ways to reduce environmental pollution that causes by production of Portland cement and by the increasing of waste material. Geopolymer is the term used to represent the binders produced by polymeric reaction of alkaline liquid with silicon and aluminium as source materials.. Common river sand is expensive due to excessive cost of transportation from natural sources. Also large-scale depletion of these sources creates environmental problems. River sand is most commonly used fine aggregate in the production of concrete poses the problem of acute shortage in many areas .In such a situation the Quarry rock dust can be an economic alternative to the river sand.

Quarry Rock Dust can be defined as residue, tailing or other non-volatile waste material after the extraction and processing of rocks to form fine particles less than 4.75mm. This paper presents the feasibility of the usage of Quarry Rock Dust as a substitute for Natural Sand in geopolymer mortar. The by-product materials considered in this study are combination of GGBFS and Fly ash. The experimental program involves casting of geopolymer mortar cubes by using GGBFS, Flyash and Quarry rock dust and testing them at 1 day, 3 days and 7 days for compressive strength. Different parameter considered in this study is alkaline fluid to binder ratio Keeping 12-Molarity of the alkaline liquid and the ratio of sodium hydroxide to sodium meta silicate as constant (1:2).

Introduction:

Concrete is the most widely used material all over the world after water. Portland Cement is the most important ingredient in making concrete whose production leads to severe environmental hazards[5]. The production of 1ton of cement emits about 1 ton of carbon dioxide which is the major green house gas contributing to environmental pollution[1].The contribution of ordinary Portland cement production worldwide in the emission of green house gas is approximately 7% to the total green house gas emission to the atmosphere. Hence there is a need to develop alternative binders to make concrete[6]. The concrete developed with this theme which is under research and practice now a days is geopolymer concrete. This revolutionary development in construction industry has been brought by Joseph Davidovits who proposed the that binders could be produced by polymeric reaction of alkaline liquids with silicon and aluminium in source materials of geological origin or bi-product materials of fly ash and rice husk ash[10]. He termed these polymers as geopolymers[2]. Palermo et al suggested that pozzolanos such as blast furnace slag might be activated using alkaline liquids to form a binder and hence totally replace the use of ordinary Portland cement in concrete[8]. Thus emerged the concept of geopolymer concrete.

Apart from cement, from thousands of years sand and gravel have been used in the construction industry. Today, the demand for sand continues to increase. So there is excessive in stream sand and gravel mining leading to the degradation of rivers[9]. This excessive instream sand mining is a threat to bridges, river banks and near by structures. Also the excessive depletion sand is the main reason for ecological

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