



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title: STUDIES ON ASSESSMENT OF SUITABILITY OF TYPICAL SYNTHETIC SURFACTANTS AND ADDITIVE FOR USE IN FOAM CONCRETE PRODUCTION

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SHORT ABSTRACT

Foam concrete which is classified as light weight concrete is basically a cement paste or mortar with air voids entrapped by suitable foaming agent. Review of literature highlighted that although there have been several investigations reported on properties of foam concrete, to date only scarce literature is available on evaluation and improvement of characteristics of foam for use in foam concrete. Hence motivated by the arduous requirement for more studies on surfactant, an in depth study on evaluation of suitability of different synthetic surfactants and additives and its performance in concrete are deemed necessary.

The present study is restricted to moist cured foam concrete made of preformed foaming method with the identified surfactants viz. sodium lauryl sulphate (SLS), nonyl phenol ethoxylated (NPE) and additive carboxymethyl cellulose (CMC). The first phase of studies comprises of evaluation of performance of foam produced with two different foam production methods namely mechanical method (stirrer) and compressed air method (foam generator). Based on comparative studies on foam production methods, it is identified that foam produced based on compressed air method (foam generator) is of better quality with lesser liquid fraction and drainage compared to that of foam produced with stirrer. Hence the further studies are carried out with compressed air method of foam production. As a next step, systematic study on the relative behaviour of foam produced with two synthetic surfactants SLS and NPE and CMC using compressed air method of foam production is carried out. Based on the comparative studies it is observed that NPE surfactant solution is highly viscous with higher initial foam density and relatively lesser early drainage when compared to that of SLS. Having identified their potential basic foaming characteristics, as a next step, the suitability of these surfactants and CMC for the production of foam concrete is evaluated as per ASTM C 796-97 and verified whether the requirements of ASTM C 869. Further the relative workability of the mixes with two different surfactants at the identified optimum water-solids ratio is evaluated through measurement of spread in a flow table and flow in modified Marsh cone. As the microstructure of concrete has greater impact on mechanical and durability related properties of concrete, the air void system is characterized based on size and shape and further correlated to density and strength of concrete. Studies confirms that the air void size distribution is relatively smaller for foam concrete with NPE when compared to that of SLS. Studies also indicates that the size of larger air voids increases sharply with reduction in density of concrete.