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PERFORMANCE OF LOCALLY AVAILABLE SLAG CEMENT AS SUPPLEMENTARY CEMENTIOUS MATERIAL

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Abstract:

Concrete is a widely used construction material all over the world. The use of ordinary Portland cement in concrete has created environmental concerns related to consumption of natural resources and emission of carbon dioxide (CO₂) gas in the environment. The use of pozzolans in the production of cement as supplementary cementitious material has minimised the emission of CO₂. Blast furnace slag is obtained during manufacturing of iron in a blast furnace as a waste material which can be used as a supplementary cementing material in finely grounded state. The chemical properties of blast furnace slag vary from furnace to furnace. This study was carried out to determine the performance of slag cement in terms of its properties such as compressive strength, permeability, drying shrinkage, expansion due to sulphates and peak temperature during hydration process. Ordinary Portland cement was replaced with 20-80 percent slag cement by weight to prepare concrete and mortar mixtures; the results were compared with the control mixture. The results indicated that slag cement concrete provides lower compressive strength at early age and higher strength at later age. Permeability, drying shrinkage and expansion due to sulphates decrease with an increase in slag cement content. Significant reduction in peak temperature during hydration reaction was observed with increase in slag cement content.

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