

ABSTRACT

Improving on our construction practices to promote sustainable development in engineering and to promote eco-friendly living is vital in the fight against global warming. The main environmental issues associated with cement production are emissions of CO₂ to the atmosphere and immense energy use. Among the greenhouse gases, CO₂ contributes about 65 percent of the global warming, and the cement production accounts for about eight percent of global human-generated CO₂ emissions. The production of cement emits approximately one ton of CO₂ per ton of cement produced into the atmosphere. The main purpose of this study is to determine the effects of Effective Microorganism (EM) on behaviour of concrete containing optimum ratio of Fly Ash (FA) as partial replacement for OPC and to study the microstructure properties of concrete containing EM and FA compared to normal concrete. This work done by five set of samples with different percentage of fly ash as partial replacement of cement by 0%, 10%, 20%, 30% and 40%. There are six tests conducted: slump test, water absorption test, density test, compression test, microstructure test and ultrasonic pulse velocity (UPV) test. Thus, the optimum ratio of partial replacement in cement can be determined through the mechanical properties of concrete. While 10% of EM solution was used to replace the water content. The results of adding EM in FA concrete showed increasing in workability from 140 mm to 160 mm and high development in the strength from 40.4 MPa for normal concrete to 51.3 MPa within 28days and from 45.4 MPa to 54.4 MPa at 56 days. For UPV test, it was found that an improve the quality of concrete from 4600m/s for normal concrete to 4700m/s for EM and FA concretes. On the other hand, the density was unaffected. While the water absorption decreased from 2.35% to 0.91% within 56 days. All these values indicated that the improvement in fresh and harden properties of normal concrete by the use of EM and FA together in concrete matrix.