

ABSTRACT

Concrete is the most common construction material in the construction industry but the increasing cost of cement production has made its use a challenge. The production of cement is also a major cause of environmental pollution due to the high emission of carbon dioxide gas. The environmental pollution may lead to health issues, hence it is essential to use locally available material as a partial replacement of cement because these materials may be economical and also friendly to the environment as compared to Portland cement without compromising on concrete strength.

There has been a focus on finding alternative uses of waste materials in order to utilize them based on their properties and ensure that the environment is safe guarded. Due to this, a mixture of waste glass powder and burnt red clay powder was used as a partial replacement of cement in concrete in this research.

Waste glass powder and red clay powder contain pozzolanic properties which make them suitable for use as a partial replacement of cement. Addition of waste glass powder and burnt red clay powder reduced the workability of concrete with each increment. It was established that the optimum percentage replacement of cement was at 15%. The samples at this partial replacement gave an average compressive strength of 39.1MPa which was greater than the control at 37.5MPa. A detailed summary of the compressive strength results can be viewed in Table 16 of Annex B. The same sample had the highest tensile strength of 2.26 MPa which was higher compared to the control mix which had 2.05 MPa. A detailed summary of the tensile strengths can be viewed in Table 17 of Annex B. The use of an ideal blend of waste glass powder and burnt red clay powder can therefore be used as a partial replacement of cement in concrete.