

Study of concrete using modified polystyrene coarse aggregate

Abstract

Polymer recycling has received a great deal of attention in recent years. At the present time, small percentages of polymer wastes in Malaysia are being recycled. The recycling process has typically consisted of reprocessing the waste material to make other polymeric products or energy recovery from complete combustion. Thus, the development of concrete using non-conventional aggregates, such as polymer waste (especially polystyrene), ceramic waste, or other wastes, has been investigated to determine the comparative properties of the various concretes and the comparative costs. This paper the results of an experimental study in which the coarse aggregates used in conventional concrete were replaced by polystyrene waste aggregate to produce a lightweight material. The proportions of the mixtures were varied to determine the water-cement ratio and the content of polystyrene waste aggregates that provide the best results. The properties of the aggregates were also compared. Strength tests were conducted after the experimental concrete was cured for 28 days, and the experimental results indicated that the strength of the concrete made with polystyrene waste aggregate ranged from 14 to 17 MPa. In addition, the density of these concretes ranged between 1467 to 1560 kg/m³, which means that they would be categorized as lightweight concretes. The results also indicated that the workability of the polystyrene waste aggregate concretes was good, and the strength characteristics were comparable to those of conventional concrete.

Keywords

Compressive strength; Conventional concrete; Polystyrene waste aggregate