SYNOPSIS

Preparation and characterization of fly ash based Pervious material for ground water recharging

Subhakanta Dash

Department of Chemistry, KIIT University, Bhubaneswar-751024, Odisha, India

Fly ash is the byproduct obtained by the combustion of coal from the Thermal power plants. In the present scenario around 160 MT of fly ash is produced and it would be increase upto 600 MT in the year 2030. Some of the problems associated with fly ash are large area of land required for disposal and toxicity associated with heavy metal leached to the ground water. An eco-friendly solution of the problems is the logical necessity is today. Now-a-days, fly ash being very effectively and economically used in cement, building components, bricks, door, synthesis of zeolite, mine backfill, road sub base material, tiles, aggregate and synthesis of dyes. Through development and application fly ash shifted from waste material category to resource material. The major threat in the present scenario is decreasing of the ground water level. With the present modernization and growing in concrete structure, recharging of ground water becomes a major challenge in front of all scientist and researcher. The concrete which are to be manufacture present age don’t have the water absorption capacity.

Keeping in view, in the above point an attempt has been taken to prepare a fly ash based porous material (FPC) for ground water rechargement and pavement application. In this study the waste raw material of thermal power plant i.e. fly ash has been used for the preparation of sintered fly ash aggregate (SFA) using down draft sintering technique. Sodium silicate is used as the binder material. The independent variables considered for the preparation of the artificial aggregate are sodium silicate and fly ash and water. The Fly ash based pervious concrete (FPC) were obtained by the mixture of three different size fly ash aggregates (4.75 mm, 9.5 mm, 12.5 mm) as considered as coarse aggregate, portland cement, water with little amount of admixture. Admixtures like silica fume (SF) and super plasticizer (SP) are additionally added to the mixture to enhance the strength properties of the concrete. Around 21 trial mix design being taken for preparation of Fly ash based pervious concrete (FPC) with different w/c ratio i.e. 0.30, 0.35 and 0.40 respectively. Tests such as compressive strength, flexural strength, splitting tensile strength, abrasion resistance test, porosity, coefficient of permeability, durability, and image analysis are done on Pervious concrete. The properties of
the fly ash based porous material (FPC) are as follows; Density of 1581-1870 kg/m$^3$, porosity (in terms of void ) of 26.79 -34.05 % and compressive strength of 7.15-17.40 MPa, water permeability 8.30 -16.07 mm/s.

The above test result concluded that, Fly ash based Pervious material (FPC) can be successfully utilized for ground water recharging and pavement application. Apart from this, this material can solve some environmental related problems such as control storm water run-off, surface mitigation, heat island effect and noise reduction and it provides greater antiskid capability which may avoid accident in rainy days.