Characteristic studies of dispersive materials with reference to slaking tests

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Slaking is a disintegration of unconfined soil or rock after exposure to the air and subsequent immersion in fluid. There is no external pressure assumed to act over soil or rock prior to immersion. Dispersive materials disintegrate without any weathering or any other external pressure when it is submerged into water. These problems can be encountered in many situations in the coal mining and irrigation project.

Certain clays exists in the nature as dispersive clays and this cannot be differentiated from the ordinary clays by routine civil engineering test methods There is an enormous difference in the fine grained soils in similar index properties. Dispersion occurs in water by a process of de-flocculation. This occurs when the inter particles forces of repulsion are greater than those of attraction, when particles get detached and go into suspension. These suspended particles are carried away by flow of water and finally they lead to failure of earth structure. Hence it is important to identify the dispersive soils

Although significant numbers of research have been carried out to identify the dispersive soils in the last 35 years, not a single test has been able to identify the dispersive soils. At present, several research projects are in progress to find an easy and simple method to identify the dispersive materials. In this study, slaking test was used to investigate the dispersive character of materials. This method is very simple, easy and cheap. Boulder clay and kaolin materials were used for this investigation.

Test apparatus consists of an electronic balance, a 800 mille litter beaker containing deionised water, and a 10 mm square wire mesh specimen holder is suspended from a cantilever stand in to beaker by a thin wire which passes through a tiny opening in the middle of the cover so that the sample is immersed in the deionised water. Cover is placed on the top of the beaker to reduce evaporation. Similar apparatus was used by Moriwaki et al (1977) to study the piping failure of earth dam.

Initially, the dominant processes were absorption of water and release of air bubbles, when the specimen was immersed into slaking fluid. It takes few seconds to commence the process. This process is very quick when the material is very much dried. A specimen with higher initial water content could reach the necessary value of water content for the dispersion faster than dried specimen near the surface. Different initial moisture contents were used for both materials

Four types of slaking behaviour were observed. (i) Swelling type of slaking (ii) dispersion slaking (iii) surface slaking (iv) body slaking Percentage of dispersion with time for different moisture content of each materials were analysed. This investigation concluded that it is possible to identify the condition under which materials disperse quickly and kaolin is more dispersive than boulder clay.

This report contains a method of testing and detailed investigations of dispersive character of boulder clay and kaolin.

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