Optimisation of concrete mix design using sandstone reactive aggregate in Sabah

Abstract

Concrete structure is significant for civilization because it is main constituent of human shelter. But it may destroy by map crack which caused by Alkali Silica Reaction (ASR). The presence of reactive aggregates, high alkaline pore solution and high moisture level in concrete are the sources of ASR. This study is aimed to develop the optimum concrete mix design to reduce the ASR of the sandstone aggregate guarries located in Sabah. The lay Brick Powder (CBP) used as a cement replacement material in the proportion of 5 % to 25 % in this study. The test includes Accelerated Mortar Bar Test (AMBT) and autoclave expansion test for mortar bar expansion and compressive strength of mortar cubes for sandstone of five samples and control sample of granite aggregates. It was observed from AMBT, the mortar bar expansion of all sandstone aggregate samples is higher than 0.10 %. Hence, the entire sample tested is harmful degree of reactivity. The AMBT and autoclave expansion test shows that the clay brick powder has a potential to be used as a cement replacement materials to reduce the harmful reactivity of the sandstone. As the percentage of the clay brick powder increases, the reactivity of the sandstones decreases. The optimum mix design to reduce reactivity and to satisfy the compressive strength of concrete for structure use was found to be at 15 % cement replaced by CBP.