Performance of various test methods for assessing the potential alkali-silica reaction

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Aggregates form a major component of concrete and have important influence on its durability. Certain deleterious minerals, if present in these aggregates, may have reaction with the cement component, leading to reduction in strength and durability of the concrete. Unstable silica minerals such as tridymite, crystobalite, chalcedony, strained quartz, cryptocrystalline and microcrystalline quartz, may react with cement to form a gel which expand upon adsorption of water. The expansion often results in the cracking of concrete.

One preventive measure to avoid having alkali-silica reactivity (ASR) in concrete is to restrict the usage of aggregates which contains reactive silica. As such, laboratory testing is vital in the selection of suitable aggregates.

One method which is widely accepted for testing the alkali-silica reactivity of aggregates is the standard mortar bar method. However, this method takes too long to complete, taking up to six or twelve months. There are other test methods to test the "ASR" of rocks, such as the

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petrographic examination of aggregates, the quick chemical test, pat test and accelerated mortar bar test, but their reliability is questionable at times.

This paper presents results of eight rock samples tested for ASR by the various methods mentioned above and the results are compared with the standard mortar bar test. Results showed that for preliminary assessment, the pat test should be used, albeit petrographic examination is also acceptable. For quick conformation of ASR, the accelerated mortar bar test is recommended. The quick chemical test gives only an indication of the ASR of rocks and is not always compatible with all types of aggregates.