

# Comparison of limit rates implicit in expansion criteria of alkali-reactivity of aggregates based on a kinetics approach

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**Abstract** Among the properties measuring aggregates reactivity towards alkali-silica reaction (ASR), linear dilatation of mortar bars or concrete prisms is often used in several tests for determining aggregate reactivity under various conditions, criteria and procedures of measuring and accelerating the reaction. As reactivity is an essentially kinetic property, the expansion limits in such tests, or even tests results for the same aggregate, should be kinetically inter-related. This paper presents a proposal of kinetic relationship for critical reaction rates, evaluated from criteria of standard test-methods NF P 18-590, ASTM C 1260, and ASTM C 1293. For this, the critical expansion rate of these tests were corrected for a reference 1N alkalinity and depicted as Arrhenius plot. The high correlation of the regression line evidences linearity of the proposed model, which was assumed as criterion of kinetic compatibility between said tests.

The discussion includes a comparison with other tests and literature comments on their evaluation. The main interest of this study is, in what concerns the potential for ASR, to discuss and compare methods aiming to improve service life of structures, by:

- i) a good materials selection;
- ii) decisions on the appropriate concrete formulation;
- iii) foreseeing possible problems allowing to plan monitoring and/or the need of adequate intervention as well as possibility for test improvements.

The extension of service life allows savings in raw materials and energy, improvement of the investment economics and, on a long term basis, lower investment requirements.

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