

### **Magnesium-sodium sulfate attack in plain and blended cements**

Rasheeduzzafar, Al-Amoudi, Omar Saeed Baghabra, Abduljawwad, Sahel N.,

Maslehuddin, Mohammad

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**Abstract:** This investigation is carried out: (1) To study the effect of magnesium-sodium sulfate environment on the performance of two plain and three blended cements; and (2) to elucidate the sulfate mechanisms on these cements in the mixed magnesium and sodium sulfate environment. After two years of exposure, deterioration is observed in all cements. However, the deterioration is more pronounced in blast-furnace-slag (BFS) and silica-fume (SF) cements. Deterioration in these cements significantly exceeds that observed in plain and fly-ash-(FA-) blended cements. XRD and SEM analyses indicate that the greater deterioration in BFS- and SF- blended cements may be attributable to the depletion of the hydrated calcium hydroxide as a result of pozzolanic reaction. In the absence of  $\text{Ca}(\text{OH})_2$ , magnesium ions react more directly and extensively with the cementitious calcium silicate hydrate to generate gypsum and noncementitious magnesium silicate hydrate resulting in aggravated deterioration.