

**Role of chloride ions on expansion and strength reduction in plain and blended cements in sulfate environments**

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**Abstract:** The deterioration of concrete due to sulfate salts in soils, groundwater and marine environments is a well-known phenomenon. While it is known that the use of low-C3A cements can provide protection against sulfate attack, the combined effect of chloride and sulfate salts on such a deterioration is highly debated and inconclusive. Moreover, the use of blended cements incorporating supplementary cementing materials, such as natural pozzolan, fly ash, blast furnace slag and silica fume, is becoming common these days. The performance of these cements in environments characterized by the conjoint presence of chlorides and sulfates, however, is not well documented. In this investigation, the effect of sulfate and sulfate-chloride environments on the expansion and reduction in strength of mortar specimens due to sulfate attack was evaluated. Results indicated that the presence of chloride ions in the sulfate environments mitigated the sulfate attack in plain and blended cements. The performance of plain cements was better than that of all blended cements. However, the performance of blended cements was observed to depend on the type of mineral admixture used, both in the sulfate and the sulfate-chloride environments.