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# Research Progress of Degradation of Mechanical Properties of Sand-Containing Cement in High Temperature Regimes

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## ABSTRACT

Sand-containing cement,as the most common cementing material used in high temperature regimes,can encounter problems such as serious degradation of mechanical properties and failure of interval sealing of cement sheath in short time when being applied to high-temperature formations.Hence,the identification of a failure mechanism of mechanical properties under high temperature should facilitate the rational usage of sand-containing cement.By investigating the relevant domestic and overseas documents surrounding the effects of high-temperature hydration products and sand (with factors of quantity and grain size considered) mixed in sand-containing cement on its mechanical properties,it is possible to summarize and analyze the results in a single paper. Results indicated that the sand-containing cement could resist high temperature in a long term under 110-210℃;under the static water environment of 210-300℃,and that this formulation was capable of slowing down the degradation of mechanical properties of cement through adjusting the granular composition of quartz sand.Results also found that under the formation temperature of higher than 300℃ and with a dynamic water environment with a large quantity of SiO2 dissolved out,the sand-containing cement couldn’t meet the quality technical requirements for cementing the targeted thermal production wells.Further,based on the analysis of the phenomena of silicon separated from sand-containing cement and the decalcification of hydration products,along with the variation of morphology of xonotlite crystalline grains,it was possible to analyze and model the failure mechanism of mechanical properties of sand-containing cement under high temperature.At the end,recommendations for technical measures that would improve the properties were proposed and advanced.