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Artificial Intelligence(AI) Revolution Challenges, Prospects and Ethical Aspects

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Heat-treated oil well sand and its exploitation in construction

Abstract

When extracting petroleum during the drilling and exploration process, large quantities of sand are left behind from petroleum wells. This sand is often mixed with drilling fluids containing environmentally harmful substances.

Many international organizations have recognized the danger of these sands, prompting oil-producing countries to take measures and enact strict laws to deal with this issue. Several global research studies propose various solutions, including the possibility of using heat to extract harmful chemicals and then disposing of the treated sands as non-contaminated.

It is known that treating these sands with heat, reaching temperatures up to 500 degrees Celsius, can alter many of their chemical and physical properties. The question arises: can we use these heat-treated sands in construction in general, and specifically as a binding material?

When using heat-treated petroleum well sands as a 100% binder, we achieve a bending resistance of 1.50 MPa and a compressive strength of approximately 0.8 MPa after 28 days. These properties improve as we add a considerable percentage of CaO, considered as clinker. When using a mixture of 50% cement and 50% heat-treated petroleum sands, the bending resistance at 28 days improves to 2.23 MPa, and the compressive strength increases to 4.8 MPa. Further improvement is observed when increasing the cement ratio to 70%, resulting in a bending resistance of 4.05 MPa and a compressive strength of 6.8 MPa after 28 days.

In conclusion, the heat-treated petroleum sands show promising potential for use in construction, especially when combined with cement, offering improved mechanical properties.

key words: Drilling fluid, heat-treated oil well sand, sand concrete, flexural resistance, compressive strength, shrinkage.