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Calorimetric studies of the physico-chemical properties of oil-well cement dispersants

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Abstract

Cement additives are typically used to modify the behavior of oil-well cement and to control its fluidity under well conditions. In this study, the retardation effect on cement hydration is investigated for a commercially available lignosulfonate and an NSF condensate at seven different concentrations. Additive solutions at 0.1% and 0.2 % each by weight of cement (bwoc) with a ratio of (1:1) are also studied. The retardation of cement hydration process is monitored via isothermal calorimetry. Rheological studies are conducted to study the plasticizing effect induced by these additives. The mechanisms accompanying this process are better understood by studying the morphology of cement/additives systems using environmental scanning electron microscopy (ESEM). The results show clearly that NSF has a retardation effect on cement hydration reflected on crystal growth. In addition, rheological measurements show that sodium lignosulfonate is more effective than NSF. The rheological effect alters with different cement/additive systems. This paper provides recommendations for applying the most effective additive dosages in drilling and well completion operations as well as enhancing the well cementing quality.

Biography

Ghada Bassioni is currently an Associate Professor and the Head of Chemistry in the Faculty of Engineering, Ain Shams University, Cairo, Egypt and is the coordinator of the Environmental Engineering Program at the British University in Egypt. She has dealt with a big variety of topics in chemistry related subjects and has over 40 scientific publications in peer-reviewed journals and conference proceedings and is a reviewer to a number of renowned scientific journals.