ABSTRACT

The critical steps that oil well cement (OWC) plays in drilling make oil well cementing arguably the most important operation performed on a well. The aim of this research was to assess the effect of coal fly ash (FA) on class G oil well cement FA (metal oxides, Loss on Ignition (LOI), morphology, particle size distribution) was characterised using X-ray Fluorescence (XRF), X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Proximate and particle size analysis.

The rheological properties of oil well cement slurries (without FA), including viscosity and shear rate were investigated at three different temperatures in the range of 23 °C to 60 °C to determine the required lignosulphonate-based mid-range water-reducing admixture (LSM) to be used. This was done by means of an advanced shear-stress/shear strain controlled rheometer. The admixture LSM had a significant effect on the rheological properties of OWC by providing the necessary required chemical properties.

Furthermore, the OWC slurries with varying FA, in the range 0-30 mass %, distilled water and varying amount of LSM were cast and cured initially at room temperature for 24 hours followed by curing at ±85°C for 2 days, 7 days and 28 days. The results obtained revealed that, the slurries mixed with a maximum of 30 percent amount of FA had a longer setting time as opposed to slurries without FA. The comparative study further indicates that, the longer the slurries were cured at higher temperature the higher the compressive strength. However, certain samples were reported to have a significant diminishing compressive strength and require further investigation in the future.