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Effect of Guinea corn husk ash with the addition of basic oil well additives under downhole conditions on oil well cementing

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ABSTRACT

Primary cementing is one of the most important aspects of completing an oil well. In Nigeria, most of the raw materials used are imported. There is therefore a need to source locally for feasible alternative raw materials which are available, cheap in conversion and environmentally friendly. The aim of this research is to investigate the effect of the partial replacement of Class G cement with Guinea Corn Husk Ash (GCHA) when cementing oil wells. Basic oil well additives are added during the process and the slurry is tested under downhole conditions. The compressive strength tests were carried out at Bottom Hole Circulating Temperature (BHCT) of 1400°C using the Ultrasonic Cement Analyzer (Chandler- Model 4265). The fluid loss tests were carried out using the Filter Press (Chandler- Model 8340). The High Pressure High Temperature Consistometer (Chandler Model 8340) was used to obtain the thickening time of the various slurries and the rheological properties determined using the Rheometer. The result obtained from the various experiments conforms to the recommendations in the American Petroleum Institute recommended practice 10B -2/ISO 10426-2. The compressive strength values were more than 3.45 MPa. The Fluid Loss was below $5 \times 10^{-5} \text{m}^3$. The Plastic Viscosities was in the range of 3.0 MPa.S - 10.0 MPa.S and the Yield Point was in the range of 10.0 lb/100ft² - 30.0 lb/100ft². The values of the thickening time were between 2.43 hrs and 11.53 hrs. More experiments should be carried out to determine the effect of GCHA on Class G cement Slurry as an extender when cementing oil wells.

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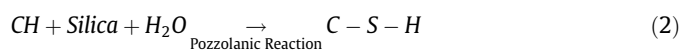
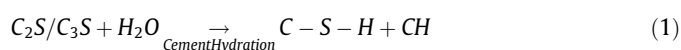
1. Introduction

Oil well cementing is the procedure of putting cement in the annulus between the casing and the formations visible to the wellbore. The major reason of oil well cementing has always been to provide zonal isolation in the wellbore of oil and gas wells to prevent fluids such as water or gas in one zone from oil in another zone. Therefore to achieve this objective, a hydraulic seal must be obtained between the casing and the cement, and between the cement and the formations, while at the same time preventing fluid channels in the cement sheath. (See Figs. 1-4).

Guinea Corn Husk Ash is an extender which is a class of additives used in preparing cement slurry for cementing operations in the oil and gas industries. Classification of extenders are based

on its general use for increase in yield and decrease in density which are in two folds that is; water-based extenders which include bentonite and light weight aggregates which include natural and artificial pozzolans. They can also be used to prevent the cement particles from settling and separating water from the slurry [1,2].

Pozzolans are siliceous and aluminous materials which in finely divided form and in the presence of moisture react with calcium hydroxide liberated from the hydration of cement to produce stable, insoluble silicate known as Calcium-Silicate-Hydrate (C-S-H) which is a very good bonding material [3] as shown in **Equations (1) and (2)**.



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