

Polysaccharides as environmental friendly additives for modification of the rheological and filtration properties of drilling muds

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Abstract

Drilling muds are one of the most important components of drilling operations. They are suspension of solids in either water or oil, which can be mixed with other substances, called additives. The drilling fluid functions should be optimized to ensure safety and minimum whole problems which are extremely costly in terms of materials and time. There are several additives used to ensure getting the appropriate functions of drilling fluids. The incorporation of the additives confirmed to reduce the loss of fluid into the formation, minimize pipe sticking, minimize losses in pressure, increase rate of penetration, reduce environmental impact and improve safety. Oil and gas drilling industry uses huge amounts of chemicals in drilling fluids as additives. Most of these chemicals are toxic and pose an excessive threat to mankind as well as the environment. On a global level, regulations to minimize utilization of toxic materials as drilling fluid components have been set to eliminating the environmental impact of expensive drilling fluid additives. The current work investigates the feasibility of using a bio-degradable waste (Barely grass) as green drilling fluid additive. The combined effect of barely grass concentration (0.29-1.7g) and bentonite (12.9-27.1g) is evaluated according to an adopted experimental design. The rheological and filtration properties were measured and compared to a reference fluid. The average range of apparent viscosity, plastic viscosity, yield point, and low-shear-rate yield point for the prepared drilling muds are 7.5-27 cP, 5-13 cP, 5-42 lb/100ft², and 2-23 lb/100ft² respectively. The mathematical models and the variables significance are estimated from response surface analysis. The optimized drilling mud has competitive rheological and filtration characteristics compared to reference fluid. The additive seemed promising alternative to commercial polymer additives owing to its high fibers content mostly polysaccharides.

Biography

Ibtisam Kamal is a Professor in the Chemical Engineering Department of Faculty of Engineering at the University of Soran-Iraq. She received her Ph.D. Degree in Polymer Technology from Basrah University-Iraq 1991 and got her HDR in Process Engineering from University of La Rochelle, France 2012. She worked as a full professor and researcher in Iraqi universities for more than 35 years. She has had more than 35 years of experience in the field of chemical engineering. Her area of expertise includes: Simulation, optimization and modeling of biofuels, eco-friendly drilling fluids and nanoparticles production processes. She is the author of more than 140 peer-reviewed papers and two patents one of them European.