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A preliminary study of the preparation of shale stabilizer with oil sludge - from waste to resource

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ABSTRACT

To convert the hazardous and waste oil sludge into shale stabilizer using in drilling fluid, a novel preparing method has been proposed in the current study. According to the characteristics of oil sludge, the preparation procedure was designed learning from conventional asphaltic-type shale stabilizer preparation method. Several additives such as gilsonite, calcium carbonate, surfactants (hexadecyltrimethylammonium chloride (CTAC) and polyoxyethylene octylphenol ether (OP-10)), polymers (polyethylene glycol (PEG-2000) and cationic polyacrylamide (CPAM)), and fluid loss reducers (sulfonated lignite and potassium humate) were incorporated into oil sludge with the assistance of melting, stirring, kneading, and drying. After the sequential steps of asphaltization, emulsification, and stabilization, a powdered shale stabilizer product (SS-OS) was obtained. The effect of SS-OS on rheology, filtration, and lubricity of drilling fluid bentonite dispersions was tested. Furthermore, the properties of stabilizing shale were evaluated. The results indicated that SS-OS could effectively inhibit shale swelling, dispersion, and exhibit excellent sealing performance. Moreover, it helped to reduce the fluid loss and significantly improve the lubricity of the drilling fluid. From the preliminary study, it was concluded that the strategy of preparing shale stabilizer with oil sludge could be employed to overcome waste, energy and environmental problems simultaneously and show promising application.

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