

Αγγλική Περίληψη

Drilling fluids are used in the oil drilling operations, in order to transfer the cuttings created by the drilling on the surface of the wellbore, the lubrication and cooling of the drill but more importantly, to enhance the wellbore stability. The most preferred drilling fluids are water-based, in which bentonite is added, so that they are eco-friendly but also economical. Production of drilling fluids is desirable to be in such a way so that they meet specific demands of the drilling operations, with tunable rheology and thermal stability at the same time. In the last years, there have been many attempts to achieve these requirements with the use of nanoparticles. In this thesis, the synthesis of nanoparticles by co-precipitation and the incorporation of them in bentonite (Na-Wyoming) water suspensions, were studied. Two kinds of nanoparticles were synthesized: magnetite (Fe_3O_4) and manganese ferrite (MnFe_2O_4). These nanoparticles were coated with citric acid, oxalic acid and polymers such as dextran and polyethylene glycol. In order for the samples to be studied physicochemically, they underwent drying with granulation in liquid nitrogen temperature (freeze granulation) and lyophilization (freeze drying). The morphology and crystal structure were studied with electron microscopy (SEM & HRTEM), X-ray Diffraction (XRD), physical sorption of nitrogen and infrared spectroscopy (FTIR). Results showed that magnetite nanoparticles coated with citric acid formed some kind of bond with bentonite, thus enhancing its rheology, even when the temperature is increased up to 60°C . Moreover, the comparison with the other coatings, showed that polyethylene glycol has similar effects on the structure.