

Reactivity of Clay Minerals of the Hydrocarbon Reservoir Rocks and the Effect of Zeolites on Operation and Production Costs That the Oil Industry in the World Assumes

Authors : Carlos Alberto Ríos Reyes

Abstract : Traditionally, clays have been considered as one of the main problems in the flow of fluids in hydrocarbon reservoirs. However, there is not known the significance of zeolites formed from the reactivity of clays and their effect not only on the costs of operations carried out by the oil industry in the world but also on production. The present work focused on understanding the interaction between clay minerals with brines and alkaline solutions used in the oil industry. For this, a comparative study was conducted where the reaction of sedimentary rocks under laboratory conditions was examined. Original and treated rocks were examined by X-ray powder diffraction (XRPD) and Scanning Electron Microscopy (SEM) to determine the changes that these rocks underwent upon contact with fluids of variable chemical composition. As a result, zeolite Linde Type A (LTA), sodalite (SOD), and cancrinite (CAN) can be formed after experimental work, which coincided with the dissolution of kaolinite and smectite. Results reveal that the Oil Industry should invest efforts and focus its gaze to understand at the pore scale the problem that could arise as a consequence of the clay-fluid interaction in hydrocarbon reservoir rocks due to the presence of clays in their porous system, as well as the formation of zeolites, which are better hydrocarbon absorbents. These issues could be generating losses in world production. We conclude that there is a critical situation that may be occurring in the stimulation of hydrocarbon reservoirs, where real solutions are necessary not only for the formulation of more efficient and effective injection fluids but also to contribute to the improvement of production and avoid considerable losses in operating costs.

Keywords : clay minerals, zeolites, rock-fluid interaction, experimental work, reactivity

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