Produced Water Treatment Using Novel Solid Scale Inhibitors Based on Silver Tungstate Loaded Kit-6: Static and Modeling Evaluation

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Abstract : Oilfield scaling is a major problem in the oil and gas industry. Scale issues cost the industry millions of dollars in damage and lost production every year. One of the main causes of global production decline is scale. In this study, solid scale inhibitors based on silver tungstate loaded KIT-6 were synthesized and evaluated in both static and scale inhibition modeling. The silver tungstate loaded KIT-6 catalysts were synthesized via a simple impregnated method using 3D mesoporous KIT-6 as support. The synthesized materials were characterized using wide and low XRD, N_2 adsorption–desorption analysis, TGA analysis, and FTIR, SEM, and XPS analysis. The scale inhibition efficiency of the synthesized materials was evaluated using a static scale inhibition test. The results of this study demonstrate the potential application of silver tungstate-loaded KIT-6 solid scale inhibitors for the oil and gas industry. The results of this study will contribute to the development of new and innovative solid scale inhibitors based on silver tungstate-loaded KIT-6. The inhibition efficiency of the scale inhibitor increases, and calcite scale inhibitor decreases with increasing pH (2 to8), it proposes that the scale inhibitor was more effective under alkaline conditions. An inhibition efficiency of 99% on calcium carbonate can be achieved at the optimal dosage of 7.5 ppm at 55oC, indicating that the scale inhibitor exhibits a relatively good inhibition performance on calcium carbonate. The use of these materials can potentially lead to more efficient and cost-effective solutions for scaling inhibition in various industrial processes.

Keywords : produced water treatment, solid scale inhibitors, calcite, silver tungestate, 3 D mesoporous KIT-6, oilfield scales, adsorption

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