

Prediction and inhibition of inorganic salt formation under static and dynamic conditions – effect of pressure, temperature, and mixing ratio

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Abstrak

As a result of waterflooding, inorganic salt precipitation occurs in the different parts of an oil production system, thereby leading to damage of production equipment. Different parameters affect the kinetics of salt precipitation. Scale inhibitors are widely used to prevent inorganic salt formation. In this study, the effect of reservoir pressure, temperature, and mixing ratio of injection to formation water on calcium sulfate and barium sulfate precipitation was investigated. For this purpose, two different formation waters and one injection water were used. In addition, the effect of temperature and mixing ratio on inhibition performance was studied. Four different existing industrial scale inhibitors and one new scale inhibitor were used. The performance of the scale inhibitors was determined under static and dynamic conditions. Results of the study showed that calcium sulfate precipitation increased with an increase in temperature and a decrease in pressure. Barium sulfate precipitation was found to increase with a decrease in the temperature. The effect of pressure on barium sulfate formation was negligible. The developed scale inhibitor showed the highest performance for the prevention of calcium sulfate and barium sulfate formation. A change in temperature from 60°C to 120°C reduced the inhibitor performance by 3%. In the cases of calcium sulfate and barium sulfate, the minimum performance of the scale inhibitor was observed when the mixing ratios of injection to formation waters were 60:40 and 50:50, respectively.