Oil Reservoir Asphalting Precipitation Estimating during CO2 Injection

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Abstract : In this paper, an Artificial Neural Network (ANN) was developed to predict Asphaltene Precipitation (AP) during the injection of carbon dioxide into crude oil reservoirs. In this study, the experimental data from six different oil fields were collected. Seventy percent of the data was used to develop the ANN model, and different ANN architectures were examined. A network with the Trainlm training algorithm was found to be the best network to estimate the AP. To check the validity of the proposed model, the model was used to predict the AP for the thirty percent of the data that was unevaluated. The Mean Square Error (MSE) of the prediction was 0.0018, which confirms the excellent prediction capability of the proposed model. In the second part of this study, the ANN model predictions were compared with modified Hirschberg model predictions. The ANN was found to provide more accurate estimates compared to the modified Hirschberg model. Finally, the proposed model was employed to examine the effect of different operating parameters during gas injection on the AP. It was found that the AP is mostly sensitive to the reservoir temperature. Furthermore, the carbon dioxide concentration in liquid phase increases the AP.

Keywords : artificial neural network, asphaltene, CO2 injection, Hirschberg model, oil reservoirs
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