Geochemical model

Laboratory

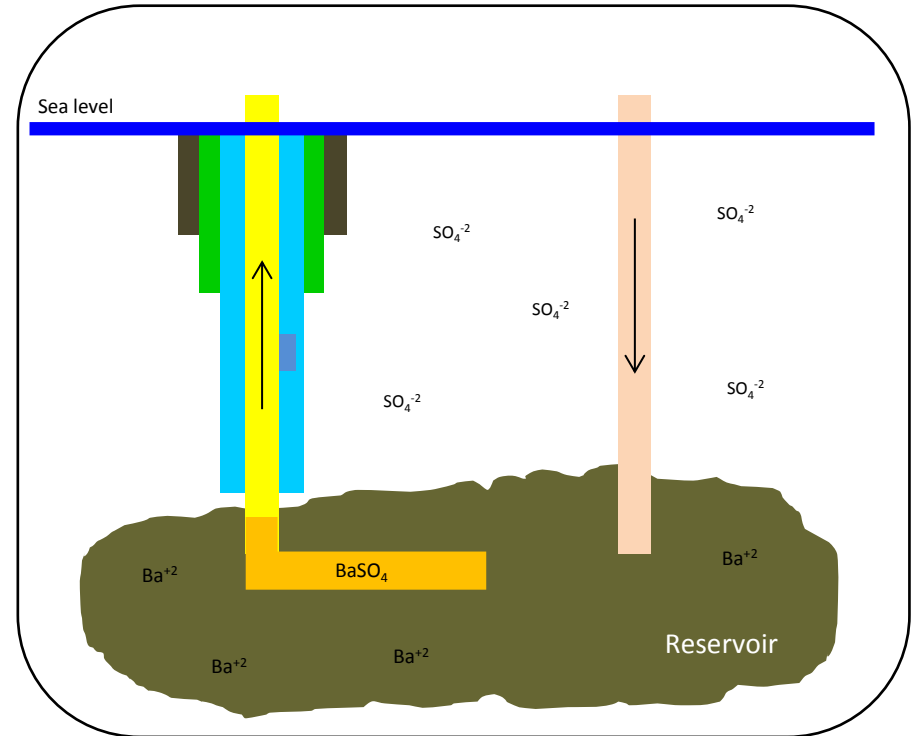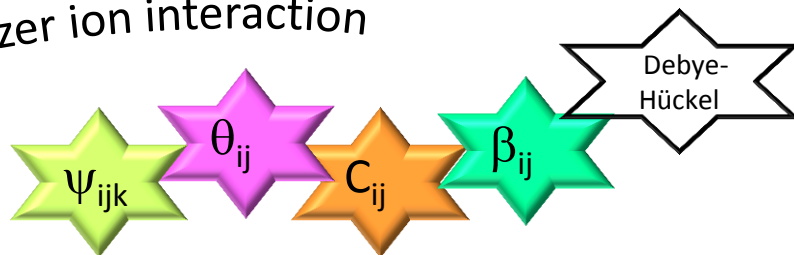Field

$$Ba^{+2} (aq) + SO_4^{-2} (aq) = BaSO_4 (s)$$

Scaling in oil producing tubings are very costly for the oil industry. One of the most challenging scale types still to be dealt with is the precipitation of barium sulphate ($BaSO_4$). The scale is formed when seawater is mixed with formation water. The development of a geochemical model will bridge the information generated by the laboratory with field observations. In order to create an accurate model for the prediction of $BaSO_4$ scale precipitation, a Pitzer ion interaction model with an internally consistent thermodynamic database would be developed.

Pitzer ion interaction

ψ_{ijk} θ_{ij} C_{ij} β_{ij} Debye-Hückel

Sea level

SO_4^{-2}

SO_4^{-2}

SO_4^{-2}

SO_4^{-2}

SO_4^{-2}

Ba^{+2} $BaSO_4$ Ba^{+2}

Ba^{+2} Ba^{+2}

Reservoir

Bi Yun Zhen Wu: Scaling in the Oil Industry

Plans for the coming reporting period:

Studying Linear algebra and other mathematical subjects as well as training to use MATLAB program in order to derive Pitzer equations and to apply statistical analysis to oil field data.

Working on a document about the Pitzer ion interaction model as well as a thermodynamic review of barite.

Teaching at the University of Copenhagen.