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# Precipitation and deposition of asphaltene in porous media: Impact of various connate water types

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## Abstract

The precipitation and deposition of asphaltene are among the least understood phenomena in upstream to downstream oil-related processes. The present experimental study investigated the impact of different connate water types on precipitation and deposition of asphaltene from synthetic oil solutions comprising of toluene, n-heptane with 5 wt. % of asphaltene in a uniformly patterned glass micromodel. To do so, different types of connate water including deionized water (DW) and brines such as CaCl<sub>2</sub>, MgCl<sub>2</sub>, KCl, NaCl, and Na<sub>2</sub>SO<sub>4</sub> ranging from 5000 to 40000 ppm were investigated. It was found that the type of cations present in the brine would profoundly influence the precipitation of asphaltene, probably due to their higher affinity towards anionic components. Divalent cations were also found to cause much more severe asphaltene precipitation compared to monovalent cations. Connate water saturation of different brines was also found to have diverse impact on precipitation and deposition of asphaltene given the type of cations present in the aqueous phase. Moreover, brine concentration influenced the amount of precipitated asphaltene due to the salting-in and salting-out effects.

**Keywords:** asphaltene precipitation, asphaltene deposition, molecular diffusion, salting-in effect, connate water salinity

## 1. Introduction

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