Geochemical evolution of oil sands upon aquathermolysis during steam injection processes for oil recovery

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Steam assisted gravity drainage (SAGD), which is used as a process for enhanced oil recovery, can lead to gas generation, mainly CO_2, associated with H_2S and light hydrocarbons. Due to the growing need for industrial and ecological impact evaluation, a better understanding of the physico-chemical phenomena (i.e. aquathermolysis) taking place in oil sands during steaming, is required in order to forecast H_2S gas production [1,2]. With this aim, the current study is an attempt to decipher the geochemical evolution of oil sands upon steaming at laboratory scale. Geochemical properties have been compared between pre-steam and post-steam oil sands, the latter resulting from aquathermolysis experiments with a duration of 8 to 20 weeks. As sulfur is known to play a role in aquathermolysis reactions through the generation of H_2S [3], we characterized the distribution of sulfur between organic and mineral phases. Changes in the organic fractions upon aquathermolysis were evaluated by means of SARA and molecular compositions (MPLC, direct elemental analysis, GCMS and GPC/ICPMS). Data for the associated mineral matrix were obtained by XRD, Rock-Eval, XRF and QEMSCAN. The results of our study allow us to better constrain the interactions between the organic and mineral phases which could occur in oil sands upon steam injection and control the amounts of H_2S generated.

References

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