GENERATION OF H\textsubscript{2}S , CO\textsubscript{2} AND ORGANOSULFURED COMPOUNDS PRESENT IN THERMAL RECOVERY PROCESSES IN OIL SANDS, ORINOCO BELT VENEZUELA

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The processes of thermal recovery (IAV, ICV, SAGD, among others) lead to aquatermolysis reactions occurring predominantly between 200 °C and the range of 300-350 °C, (Clark and Hyne ,1984), the concentrations of sulfur obtained in crude oil samples (3.05-4.37%) and API (7.29-9.56), which correspond to extra-heavy crude that has been biodegraded at the site within the scale of (Peter and Moldowan, 2005) ≥ 5 which is found in reservoir rocks of Miocene age belonging to the Formation Office, Venezuela. For this reason, it is important to know the generation and concentrations of H\textsubscript{2}S, CO\textsubscript{2} and all the acid gases generated and the possible organosulphur compounds present since they are the precursors of damages in the human being as in the industry.

In the present investigation the experimental simulations were carried out in reactors in lines with parameters of pressure and temperature of (750 Psi, 1200Psi, 200 °C and 300 °C) where the V\textsubscript{oil}:V\textsubscript{water} is 1: 2 and sands of (95.5% SiO\textsubscript{2}, 1.2% FeS\textsubscript{2} and 3.3% clay minerals, these reactions were generated in gold tubes at time intervals of 1 to 21 days, (Figure 1) where once the reactions were complete acutermolytic the extracted gas was injected in gas chromatograph to identify and quantify the gases generated.

Fig. 1. Methodology for experimental simulations
The results obtained in the present investigation show a proportional relationship between the increase of the temperature and the time of reaction in the generation of H$_2$S reaching concentrations of 3870 ppm related to 2.55 mL of H$_2$S / g.oil sand, for the generation of CO$_2$ as the reaction time increases decreasing the concentration until a minimum of 1.70 mL of CO$_2$ / g.oil sand is reached, it is important to mention that at 200 ° C the concentrations of H$_2$S are significantly lower (Maximum generation 0.13 mL of H$_2$S / g.oil sand equivalent to 212 ppm H$_2$S) compared to 300 ° C, which suggests possibly thermal cracking of organosulfur compounds identified among them Dibenzothiophenes present in the aromatic fraction of the crude, Said identification was performed using a GCxGC TOF gas chromatograph (Figure 2). The GC×GC system for GC×GC–TOFMS was from Leco Corporation. The GC×GC system was composed of an Agilent 7890 GC coupled to a hydrogen flame ionization detector (FID) and a liquid-nitrogen-cooled pulse jet modulator. The time-of-flight mass spectrometer was a Pegasus 4D (Leco Corporation). All the data were processed with the ChromaTOF software. However, the amount of H$_2$S generated during the vaporization process is also correlated with the amount of polysulphides (R-Sx-R) thiophenes and Tiols (R-S-H) present (Ibatullin T, et al., 2011).

Figure 2. (A) Generation profile of acid gases, (B) 2D Chromatogram of organosulfurated compounds, aromatic fraction.

Referentes

