

2nd International Conference on ANALYTICAL CHEMISTRY AND CHROMATOGRAPHY METHODS

November 20-21, 2019 | Berlin, Germany

Ofasa Abunumah et al., J Chem Tech App 2019, Volume 3

MATHEMATICAL MODELLING AND EXPERIMENTAL INVESTIGATION OF GAS FLOW COMPETITIVENESS IN POROUS MEDIA FOR ENHANCED OIL RECOVERY PROCESSES

Ofasa Abunumah, Priscilla O Ogunlode and Edward Gobina

The Robert Gordon University, United Kingdom

A study to investigate the comparative displacement profile of gases injected in Enhanced Oil Recovery (EOR) has been conducted using ceramic porous material. Mathematical and experimental techniques were applied. Data clustering analysis of a global EOR database identify relative gas-oil mobility ratio as a critical parameter in evaluating displacement efficiency of gases. Series of experiments were subsequently conducted to determine the gas that could offer the optimal relative mobility profile. Seven gases and mixtures (CH_4 , CO_2 , N_2 , Ar, He, 30% CO_2/CH_4 and 28% O_2/N_2) were investigated using characteristic ceramic membranes (Pore sizes: 15nm, 200nm and 6000nm) at temperature and gauge pressure range of 295K–675K and 1atm–3atm respectively. Data mining of the EOR database indicates that CO_2 gas is mostly applied to recover oil with low mobility (0.064D.cp-1) while CH_4 gas is applied to highly mobile oil (1.680 D.cp-1). Experimental analysis reveals that the performance of CO_2 in heavier oil could be explained by its comparatively low mobility factor (0.0602) as against N_2 (0.0674) and CH_4 (0.0878). Further analysis indicates that through 'mobility-control', N_2 and CH_4 gases could be optimized to achieve CO_2 performance. Reservoir engineers could therefore use this knowledge to effectively substitute the more expensive CO_2 with N_2 or CH_4 without compromising on oil recovery efficiency.

BIOGRAPHY

Ofasa Abunumah is a Senior Petroleum Engineer in the Ministry of Petroleum Resources, Nigeria. Currently he is leading a Doctoral research at the Centre for Process Integration and Membrane Technology in the Robert Gordon University. He has acquired qualifications in Chemical Engineering, Petroleum and Environmental Technology, Information Technology, Business and Accounting. He has over 10years experience working in the oil and gas industry. He has facilitated crucial petroleum data management projects, such as the Compendium of Petroleum Statistics. His recent research focus includes membrane technology, flow through porous media and Enhanced Oil Recovery. His strengths include experimental, mathematical and cost modelling.

o.abunumah@rgu.ac.uk