

Carbon dioxide sequestration for enhanced heavy oil recovery

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With the current gap between demand and supply in hydrocarbons expected to increase beyond 20MBOE by 2020 and beyond Offshore and shale reservoir heavy oil fields represent a significant and growing resource of in-place volume to restore the Global oil stock reserves and demand. Carbon dioxide gas (CO₂) provides a unique resource for enhanced heavy oil recovery.

This paper and presentation will focus on background research programme at Robert Gordon University (RGU) on the use of CO₂ for heavy oil recovery the results of which have so far confirmed that

- i) CO₂ needs to be at super critical pressure and temperature for it to be utilised for EOR
- ii) Improved recovery can effected by a combination of miscibility -immiscibility mechanism. - The CO₂ at appropriate high pressure and temperature can be miscible with the heavy oil, and, once dissolved, it has two effects. First, it causes the oil to swell, thereby lowering the oil's viscosity significantly and making it flow more easily in response to pressure gradients. Secondly under the miscible conditions it reduces the interfacial (capillary) forces that cause the heavy oil to stick to the reservoir rock.

However the process of the interaction between the CO₂ and the rock matrix and rock fluid is not yet fully understood. There is evidence that, from formation chemistry aspect, there can be foaming phenomena that can dramatically affect the integrity of the rock matrix and its flow and petrophysical properties now is the subject of a new follow-up research the details of which will also be presented.

Biography:

Babs Oyenevi is a Professor of Petroleum Engineering at Robert Gordon University specialising in Well Engineering, Sand Management and Multiphase Flow Assurance. He is a Petroleum Engineer by training with background in Mechanical Engineering. For more than three decades he has initiated and worked on student-centred joint industry projects with focus on sand management, produced water and improved hydrocarbon recovery technologies. He is the founder and Chairman of the Joint Industry Sand Management Network (www.sandmanagement.com) He is a champion of integrated petroleum engineering solutions using a hybrid of predictive modelling and case-based reasoning with Virtual Reality Technology for real-time oilfield problem diagnosis and hydrocarbon production optimisation.

His current interests are in unconventional heavy oil and shale reservoir management