Foamy Oil Production in Trinidad

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Abstract

The process known as Cold Heavy Oil Production (CHOP) is when heavy oil reservoirs are produced by pumping the reservoir fluids to surface, and no heating of the reservoir is carried out to lower the oil viscosity. Due to the high oil viscosity, recoveries are often less than 5% of the oil in place in the reservoir. However, certain heavy oil reservoirs exhibit higher than expected oil recoveries, more in the range of 5%-25% of oil in place, and higher than expected well productivity. Also, this produced oil shrinks significantly at the surface over a couple of days, maybe by over 70% of the original produced volume. This type of heavy oil fluid behavior is different to that of 'normal' heavy oil, and is called 'foamy oil' behaviour. Foamy oil behavior occurs with some heavy oils below their bubble point, and is found in certain Canadian, Venezuelan and Trinidadian heavy oil reservoirs. The peculiar production mechanisms are a result of the evolution of gas from the oil which then remains entrapped in the oil as minute bubbles, less than pore matrix size, within the unconsolidated sand matrix. This paper explores foamy oil production with sanding. After a review of current theory of production mechanisms of foamy oil solution gas drive, a simple, foamy oil model system of wallpaper paste solution (carboxyl-methyl cellulose and water) and antacid mixture is presented. This model system could be used to study a number of the physical processes and properties needed to further understand foamy oil. It does not need high pressure apparatus which otherwise make any experiment slow and expensive, and the equipment difficult to clean. Additionally, sanding is regarded as an essential part of the production of foamy oil and in particular the phenomena of sand dilatancy along with the use of progressive cavity pumps. These topics are then outlined and conclusions are made on directions for the production of Trinidad's heavy foamy oil reserves.

Keywords: Heavy oil, foamy oil, dilitancy, sanding, cold heavy oil production with sanding (CHOPS).