

## عنوان مقاله:

Laboratory Investigation of Immiscible Heated WAG Process Performance in Conventional Sand Pack

## محل انتشار:

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## خلاصه مقاله:

Gas injection has been one of the most common enhanced oil recovery processes in recent years. To increase the extent of gas effects on the oil recovery in the reservoir by gas injection, the gas is generally injected intermittently with water. This mode of injection is called Water-Alternating-Gas (WAG) method. Immiscible WAG injection has been implemented in a number of oil fields around the world and also there are a number of numerical studies investigating the effect of different parameters on WAG performance. However, there are very few laboratory studies of WAG displacement efficiency reported in the literature. In this paper, an experimental study of immiscible Heated WAG injection into a conventional sand pack is presented in comparison with Unheated Gas injection, Heated Gas injection and Unheated WAG injection at the same conditions. This method is a combination of WAG and thermal process and can be used to produce heavy and semiheavy oils from hydrocarbon reservoirs too. In this experimental study, the sand pack was initially saturated with dead oil and irreducible formation water. A number of WAG, Heated WAG, carbon dioxide as the injection Gas, and Heated Gas cycles with low and constant rate and, below the minimum miscibility pressure for this system were injected into sand pack. Results of laboratory tests showed that oil recovery efficiency resulting from the immiscible Heated WAG injection is about 24%, 12% and 15% more than unheated Gas injection, Heated Gas injection and unheated WAG injection intermittently. These results also indicate that using heated water and heated CO<sub>2</sub> instead of unheated water and CO<sub>2</sub> can lead to interfacial tension reduction, oil swelling and viscosity reduction. Therefore, immiscible heated WAG injection can be used as an effective and feasible enhanced oil recovery method in oil reservoirs with significant improved results.

## کلمات کلیدی:

WAG Injection, EOR, Immiscible, Thermal

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