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Paper Preview

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Title	**Improving Sandstone Matrix Acidizing for Oil Wells by Gas Preconditioning**
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Preview

Abstract

Experience has shown that for sandstone formations, oil wells respond to matrix acidizing in a different manner as compared to gas wells. For oil wells, the improvement in permeability resulting from the stimulation treatment peaks at a certain acid volume and then drops as the volume of acid injected increases. For gas wells, however, the resulting improvement in permeability is roughly proportional to the volume of acid injected, and is normally better than that obtained with oil wells. It is, therefore, expected that stimulation of oil wells in sandstone formations could be improved by displacing the oil in the zone to be acidized with gas. Gas injection prior to acidizing is sought to minimize the formation of emulsions or sludges between the spent acid products and the oil that otherwise would be contacted.

This paper presents the results of an experimental investigation on the effect of gas pre-conditioning of the damaged sand on permeability improvement by matrix acidizing. Experiments were conducted on Berea sandstone cores saturated with 29.2 °API crude oil at selected reservoir conditions of 180°F and 3000 psi pore pressure. Carbon dioxide and nitrogen were separately used for pre-conditioning prior to stimulation and the results were compared against stimulation without gas pre-conditioning.

It was found that with regular stimulation, improvement in permeability peaked at a certain acid volume. With gas (CO_2 or N_2) pre-conditioning, however, continuous improvement in permeability was obtained with increasing the volume of acid injection. Further, using gas pre-conditioning with a small volume of acid (that would otherwise not be sufficient to even recover the original permeability with regular acidizing) resulted in permeability improvements of up to 200% of the original pre-damage permeability. At an acid volume that would just restore the original permeability with regular stimulation, gas pre-conditioning resulted in permeability improvement close to 300% of the original permeability. Pre-conditioning with either CO_2 or N_2 provided superior results compared to regular stimulation. However, CO_2 was found to be more effective than N_2. This is attributed to the fact that CO_2 has better miscibility than N_2 and would, therefore, provide more efficient displacement of the oil out of the zone to be stimulated.

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http://www.spe.org/spe/jsp/basic/0,,1104_1561,00.html