IOR: Improving Polymer Selection, Connecting Lab Results with Field Operation

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Abstract

Polymer injection showed a strong growth at international level as a result of successful implementations in Daqing field (China), where polymer is being injected in more than 20,000 wells with an incremental production of 14% over secondary recovery. Taking into account this antecedent and due to the necessity of improving the sweep efficiency and production acceleration in our country, YPF has planned the implementation of polymer injection in those reservoirs identified with potential for this technology.

Laboratory studies became a previous and fundamental stage to select the right polymer, as well as determining the target viscosity during flux (resistance factor) and rock adsorption. All this information will help to simulate the process and estimate operative costs.

Partially hydrolyzed polyacrylamides are the polymers widely used for these applications. One of the most important aspects to consider during injection is controlling chemical and mechanical polymer degradation at the lowest cost. Several chemical degradation processes might occur and the one with greatest relevance is the originated by free radicals. These radicals are generated by redox reactions in the aqueous media, and they attack the polymer chain lowering the molecular weight and viscosity.

In this work, laboratory resistance factor and retention determinations are discussed. During the core flow tests, run with formation plugs, chemical degradation occurred. It was demonstrated this kind of degradation process could be controlled by the addition of a reducing agent, assuring the reduced state by means of ORP (oxidation reduction potential) measurement.

On the other hand, the impact of these results might have during field implementation is discussed, as well as if injection water oxygen content is in the order of ppm. As a main conclusion, chemical degradation will not occur under reservoir reductive conditions. Best practices to avoid degradation in surface facilities and lab experiments are also mentioned.