CARBON DIOXIDE: THE NEXT BEST THING FOR UNCONVENTIONAL LIQUID RESERVOIRS EXPLOITATION

Sidewall preserved cores with permeability in the nanodarcy range do not allow for conventional CO₂ flooding. A hydraulic fracture is represented by surrounding the shale cores by a high permeability porous media artificially created using glass beads inside an aluminum core holder.

A core flooding equipment is set up on a medical CT scanner. The core holder is placed inside a water bath that is kept at reservoir temperature. A back pressure regulator is used to keep reservoir pressure. A combination of syringe pumps and accumulators are used to provide overburden pressure and to inject carbon dioxide inside through the high permeability media. CT scans are performed regularly to track the effect of CO₂ injection in the unconventional cores.

Oil recovery from 20 to 50 % of OOIP has been obtained in a huff and puff scheme. The change in average CT number with time reveals that carbon dioxide is penetrating the nanodarcy porous media. Visual examination of the CT images and the oil recovered suggest that hydrocarbon vaporization is the main mechanism of production. Changes in core mass indicates CO₂ adsorption.

The use of CT imaging has revealed CO₂ is a promising enhanced unconventional liquid reservoir agent.