Influence of a Single Fracture and Its Aperture on Gas Production from Tight Reservoir

Abdelaziz Khlaifat[1,*], Hani Qutob[1], and Hamid Arastoopour[2]
[1]*Weatherford Oil Tool Middle East Ltd., Dubai, UAE*
[2]*Department of Chemical and Biological Eng., Illinois Institute of Technology, Chicago, USA*
***Corresponding Author:** abdelaziz.khlaifat@me.weatherford.com*

Tight gas exists in reservoirs with very low porosity and microdarcy range permeability and has an enormous future potential for production. Usually production from tight gas wells is low compared to gas production from conventional reservoirs. Tight reservoirs cannot be produced economically without hydraulic fracturing. This paper presents an experimental study of enhancing gas recovery from low permeability reservoirs by the creation of a single fracture perpendicular to the flow direction. The considered porous medium sample was slot-pore type tight sand from the Travis Peak Formation with permeability in microdarcy range and porosity of 7%. A series of single-phase experiments (gas and water) were conducted at different pressure drops ranging from 100 to 600 psig and at overburden pressures of 2000, 3000 and 4000 psig, respectively. The obtained results showed that the sample used is very sensitive to overburden pressure. Also, the experimental data showed that the presence of a fracture in a low permeability porous media is the key factor for enhancing the gas recovery from tight gas reservoirs. The presence of a fracture enhances the gas flow, not only due to the increase in overall permeability, but also due to the creation of different flow patterns which locally shifted the two phase flow away from capillary force domination region. Furthermore, the fracture aperture plays a significant role in enhancing flow due to both reconfiguration of connecting pores and joining of the non-connecting pores to the flow network.