Study of the Effect of the Corners in the Mass Transfer in Porous Media for 30 and 40 °C to 3 and 4 MPa

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The present simulators do not consider the polygonal structure that is present in pores in the reservoir, therefore this study has the objective to analyze the influence of the geometry of the porous matrix on the process of mass transfer that originates when miscible CO_2 is injected. We use square and cylindrical capillaries to describe the geometry of the system. When considering the presence of corners it is necessary to consider the angularities form filaments that ascend by capillarity effects, which are an important factor in the analysis of the mass transfer in real systems. Experiments were carried out where we visualized the formation and advance of filaments in square capillaries, oriented of vertical form for different hydrocarbons. In addition, the process of mass transfer in square and cylindrical capillaries was compared. The results obtained demonstrate that the filament formation must to the instability generated by the gas-liquid-solid interface when it is fulfilled that the angle of contact of the interface plus half of the angle of the corner is equal or smaller to 90º. In a qualitative analysis of the process of mass transfer it was obtained that the displacement of meniscus in the case of the square capillaries is major that in cylindrical capillaries, in addition, was demonstrated that the displacement of the interface falls with the increase of the molecular weight of the alkenes used, product of the increase of the angle of contact and the surface tension. The filament formation in the angularities increases the total area of mass transfer increasing the interface activity, indicating that in the presence of corners there occurs a process of convective mass transfer of great magnitude that improves the phenomenon of existing transference in the system.