Dynamic viscosity, interfacial tension and mass diffusion coefficient of *n*-hexane, cyclohexane, 2-methylpentane and CO_2 systems

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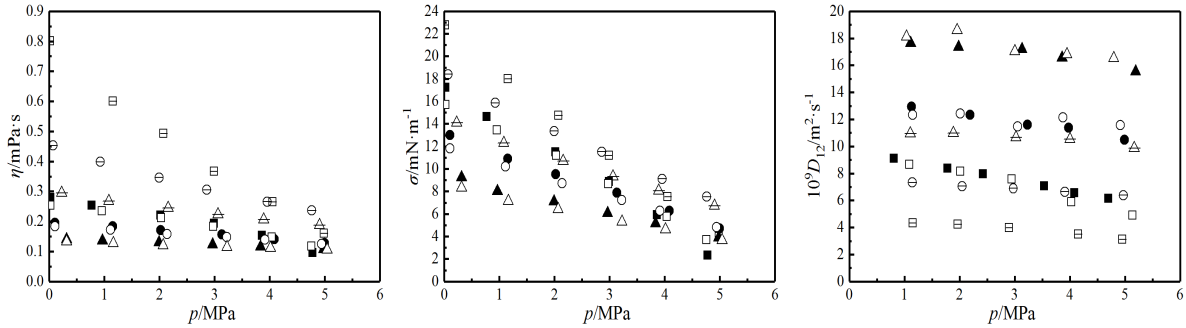
Dynamic viscosity, interfacial tension and mass diffusion coefficient of CO_2 in hydrocarbons are the fundamental transport properties in the CO_2 flooding technology applied in oil exploitation, which can improve the oil recovery rate effectively and complete the geological burial of CO_2 [1]. In this work, *n*-hexane, cyclohexane and 2-methylpentane were selected to represent linear-alkanes, cycloalkanes and branched alkanes, respectively. Based on the light scattering method, the viscosity, interfacial tension and mass diffusion coefficient of *n*-hexane/CO_2, cyclohexane/CO_2 and 2-methylpentane/CO_2 were measured in order to explore the change trend of thermophysical properties of the systems with the same carbon atom number but different molecular structures. The experiments were conducted at the temperatures of 303 K, 343 K and 383 K and at pressures up to 5 MPa. The expanded uncertainties ($k = 2$) of dynamic viscosity, interfacial tension and mass diffusivity were 2.5%, 2% and 5%, respectively. The experimental results show that *n*-hexane and 2-methylpentane with similar molecular structure have more similar values of properties, while cyclohexane with cyclic structure has lower thermophysical properties than the others.



n-hexane/CO_2: (■) $T = 303$ K; (●) $T = 343$ K; (▲) $T = 383$ K; cyclohexane/CO_2: (⊟) $T = 303$ K; (⊖) T=343 K; (△,—) $T = 383$ K; 2-methylpentane/CO_2: (□) $T = 303$ K; (○) $T = 343$ K; (△) $T = 383$ K

Figure 1: Dynamic viscosity, interfacial tension and mass diffusion coefficient of *n*-hexane, cyclohexane, 2-methylpentane and CO_2 systems.

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References:

[1] O. A. Moultos, I. N. Tsimpanogiannis, A. Z. Panagiotopoulos et al.: *Atomistic molecular dynamics simulations of carbon dioxide diffusivity in n-hexane, n-decane, n-hexadecane, cyclohexane, and squalane*. The Journal of Physical Chemistry B **120**(50),12890-12900 (2016).