

Quantitative Raman Spectroscopic Measurements of SO₂ Solubility in Water from -10 to 120 °C and from 5 to 30 MPa

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Co-injection of SO₂ with CO₂ to reservoir can accelerate the reaction of water-rock [1] and increase the permeability for EOR. The solubility of SO₂ in water is essential to understand the interactions and alterations taking place among reservoir rocks [2]. However, in literature limited experimental data can be found on the solubility of SO₂ in water. In this study we use the unsaturated homogenized solution method [3,4] to establish the quantitative relationship between concentration of SO₂ in water and Raman peak area ratio (PAR), and then obtain the solubility of SO₂ from -10 to 120 °C and from 5 to 30MPa. The results show that, SO₂ solubility in water increases with increasing pressure. At temperatures below 20 °C, SO₂ solubility in water slightly decreases with increasing temperature, but increases considerably when the temperatures above 20 °C. We will modified thermodynamic model to predict SO₂ solubility data at high temperature for further research.

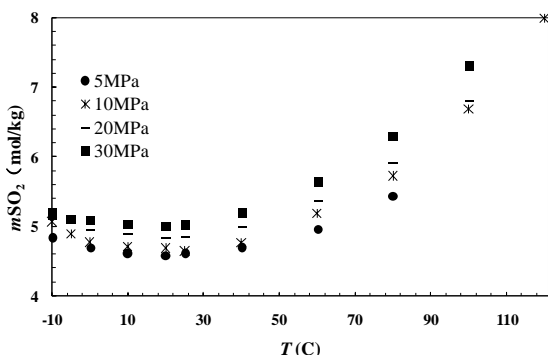


Figure 1: Solubility of SO₂ in H₂O (mSO₂) plotted with temperature (T) under 5 MPa (●), 10 MPa (*), 20 MPa (—), 30 MPa (■)

- [1] Crandell *et al.* (2010) *Environ. Sci. Technol* **44**, 349–355.
 [2] Stevanovica *et al.* (2014) *Energy Procedia* **63**, 3775 – 3781.
 [3] Guo *et al.* (2014) *Fluid Phase Equilib* **382**, 70–79. [4] Ou *et al.* (2015) *Fluid Phase Equilib* **391**, 18–30.