

Kiatpracha Srikhumbao 2011: Kinetics of H₂S Removal Using Iron Chelate Solution and Mass Transfer in an Auto-Circulating Reactor. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Associate Professor Sunun Limtrakul, D.Sc. 114 pages.

The H₂S removal process via iron chelate solution consists of two steps, the removal reaction step and the regeneration reaction step. An auto-circulating reactor is appropriate for H₂S removal due to the advantage in combining two steps of reactions in a single reactor. Kinetics and mass transfer information of this system is important for reactor design and prediction of the performance of an auto-circulating reactor. Experimental studies of kinetics for H₂S removal and chelate regeneration reactions and mass transfer parameters in an auto-circulating reactor were carried out. The intrinsic kinetics rates of both reactions were obtained in a semi-batch stirred reactor with and without mass transfer considerations. In addition, the rate was also studied in an auto-circulating reactor. The results show that the intrinsic kinetics rates are $-r_1 = 15.76 C_{H_2S} C_{Fe^{3+}}$ and $-r_2 = 0.16 C_{O_2} C_{Fe^{2+}}^2$ for removal and regeneration reactions, respectively. Finally, the studies of mass transfer parameters in an auto-circulating reactor suggest that the interfacial area of 93.4 m²/m³ in the riser is higher than the area of 20.6 m²/m³ in the downcomer. The mass transfer coefficients in the riser and the downcomer are 2.64×10^{-5} and 1.13×10^{-5} , respectively.

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Thesis Advisor's signature

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