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Effects of high-pressure carbon dioxide on the demulsification of O/W emulsion

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ABSTRACT

A new process for the demulsification of oil-in-water (O/W) emulsion with high-pressure carbon dioxide (CO_2) was proposed. For the confirmation of the concept, demulsification of O/W emulsion formed with a nonionic surfactant, Tween 20, was conducted. The behavior of O/W emulsion under high-pressure CO_2 was examined with a visual observation and an electrical conductivity measurement of the emulsions. Efficiency of the demulsification was evaluated by the oil content of water-rich phases and the amount of water-rich phases separated from the emulsion by the creaming of the oil phases. Experimental results revealed that the high-pressure CO_2 acts as a swelling reagent that lowers the density of the dispersed oil phase to induce the floatation of the oil droplet that leads to an efficient demulsification.

Keywords: Wastewater treatment; High-pressure CO_2; O/W emulsion; Flotation

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