Emulsification of bitumen-in-CO2 from oil sands by ultrasonic wave radiation

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It is necessary to develop unconventional oil resources because of depletion and rising cost of conventional light oil. The recovery of bitumen and heavy oil from oil-bearing rocks, including oil sands, has been of great interest due to the huge amount of global reserves. Viscosity of bitumen is much higher than heavy oil. However, extracted bitumen from oil sands can be converted to light oil through reforming process. In this study, we aim to develop useful methods of separating bitumen from oil sands. Bitumen-in-CO2 emulsions were formed using ultrasound radiation under the high pressure cell, and recovery efficiencies were analyzed under varying conditions of temperature, ultrasonic power, irradiation time and additives. The bitumen-in-CO2 was well dispersed with increases in temperature, ultrasonic power and irradiation time. Supercritical CO2 combined with ultrasonic radiation technology is expected to provide eco-friendly technologies of recovering bitumen from oil sands.