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## THOROUGH CO<sub>2</sub> CAPTURE AND CONVERSION BY ACCELERATED MINERAL CARBONATION PROCESSES WITH CA<sup>2+</sup>, MG<sup>2+</sup> //CL<sup>-</sup> SYSTEM

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**T**his study promotes a two-step accelerated mineral carbonation technology at moderate temperature and atmospheric pressure, by choosing the problematic ions for seawater utilization as mineralizers, that is, Ca<sup>2+</sup> as the first mineralizer and Mg<sup>2+</sup> in the residual solution as the second. Therefore, not only carbonate ions generated from the absorption and ionization of CO<sub>2</sub> can be fixed by Ca<sup>2+</sup> through first carbonation process with the added alkali source MgO, but also HCO<sub>3</sub><sup>-</sup> in the residual solution can be mineralized by Mg<sup>2+</sup> through second carbonation process with the added NaOH. Meanwhile, pure CaCO<sub>3</sub> and MgCO<sub>3</sub>·3H<sub>2</sub>O with possible beneficial reuse can be obtained as by-products. Moreover, softened water is beneficial for long-term stable equipment operation, energy saving and the reduction of economic cost for the following desalination. The corresponding mechanism for first carbonation by ionizing magnesia was presumed according to ions concentration changes, precipitants conversion. Then more variables were set to optimize technical conditions. Under the optimum condition, decalcification rate can reach above 92.0%, carbon sequestration changes from 30% and 50%, and the reaction time is only 10 mins with pure CaCO<sub>3</sub> as by-product. In the second carbonation process, the carbonation of residual HCO<sub>3</sub><sup>-</sup> by Mg<sup>2+</sup> was realized by adding NaOH, and the magnesium extraction can reach about 75% with pure MgCO<sub>3</sub>·3H<sub>2</sub>O as another by-product.

### Biography

Doctor Zhao is the associate professor of Hebei University of Technology. She previously studied at Tianjin University (China) from 2007.09 to 2012.01 and during this period she had been to the University of Western Ontario (Canada) at Department of Chemical and Biochemical Engineering as a visiting scholar from 2010.08 to 2011.08. Now, she is the department head of marine technology at Hebei University of Technology. From 2012 to now, she has directed 1 Scientific Research Project at nation level, 4 Provincial and Ministerial Project, 1 other Key Project, and 2 other Industrial Project. And she has participated in 4 Scientific Research Project at nation level, 1 Provincial and Ministerial Project, 2 other Key Project, and 1 other Industrial Project. Meanwhile, she has published 5 issued patents and more than 20 academic papers with the citation frequency more than 50. Associate professor Zhao's research interests in seawater resources utilization and environmental protection. The focus of her current research is on seawater decalcification, extraction of potassium from seawater, CO<sub>2</sub> capture, mineral carbonation, seawater desulfuration, separation technology of inorganic salts, and industrial crystallization.

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