



## Successive cycles of sorption/regeneration for granular activated carbon in the removal of nitrate ions

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### ABSTRACT

Granular activated carbon was used in the sorption of nitrate ions with subsequent regeneration by assessing the capacity of the sorbent in successive cycles of sorption/regeneration (S/R). Solutions of HCl, C<sub>6</sub>H<sub>8</sub>O<sub>7</sub>, NaOH, CaCl<sub>2</sub>, as well as H<sub>2</sub>O were employed in the regeneration of activated carbon saturated with nitrate. Solution of CaCl<sub>2</sub> was the best regenerative agent. Contact times of 30 min and 400 mL of 2,000 mg L<sup>-1</sup> CaCl<sub>2</sub> solution were used for regeneration. Twenty cycles of S/R, which yielded 54% nitrate removal at the end of the cycles, were possible. During regeneration, the concentration of Ca<sup>2+</sup> in the solution of CaCl<sub>2</sub> was monitored to keep the initial concentration constant. After 20 S/R cycles, the sorbent was desorbed using 50 mL of 100 mg L<sup>-1</sup> HCl and 50 mL H<sub>2</sub>O (60°C). Over 20 S/R cycles were performed for the sorbent recovered with HCl and 20 S/R cycles for the sorbent desorbed with H<sub>2</sub>O (60°C). Approximately 58% of nitrate removal was achieved at the end of 20 S/R cycles in both cases. We performed a total of 60 S/R cycles with the average removal of 55% at the end of the last cycle.

*Keywords:* Regeneration; Sorption; Activated carbon; Nitrate ions; Cycles

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