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(54) Title: IMPROVED ION EXCHANGE PROCESSES FOR SOFTENING WATER

(57) Abstract: A process for softening hard water comprising the steps of: a) contacting hard water with a thermally regenerable ion exchange resin pre-saturated with ammonium and bicarbonate ions so as to replace 'hard' ions in the feedwater with NH_4^+ and HCO_3^- ions; b) heating the ammonium bicarbonate (AB) solution produced to decompose the AB, producing a soft product water of low salinity; c) collecting the emitted ammonia and carbon dioxide gases by bubbling through cool water to re-form the concentrated AB regenerant solution; and d) passing the concentrated ammonium bicarbonate solution through the hardwater exhausted resin, at elevated temperatures (up to 80°C) to partially decompose the AB and generate controlled partial pressures of NH_3 and CO_2 (up to 10 atm, in a sealed column) to drive the resin regeneration process. e) repeating steps a) to d).



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