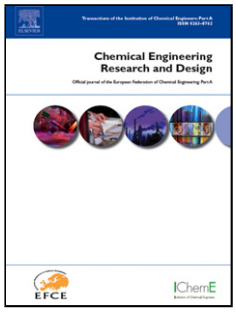

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Concomitant removal of NO_x and SO_x from a pressurized oxy-fuel combustion process using a direct contact column

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Highlights

- The removal efficiency of NO_x and SO_x depends on pressure.
- Pressurization enhances gas-phase oxidation of NO and the removal efficiency.
- The effects of recycle and liquid-to-gas flow ratio were investigated.
- N-S specious interactions in the liquid phase facilitate the removal of NO_x and SO_x.

Abstract

The simultaneous removal of NO_x and SO_x using a direct contact column has potential for efficient treatment of the flue gases arising from pressurized oxy-fuel combustion. This study focuses on a parametric analysis of the efficiency of NO_x and SO_x removal from the flue gas of an oxy-fuel combustion process using an Aspen Plus direct contact column model. The chemistry implemented in this model reflects the state-of-the-art NO_x and SO_x reaction mechanisms, with particular emphasis on the liquid-phase chemistry, including pH-dependency. The effects of pressure, water flow rate, and recycle ratio on the removal efficiencies of NO_x and SO_x were evaluated. The evaluation was conducted based on the base case pressurized (15 bar) flue gas with a feed rate of 120 kg/s and inlet temperature of 40 ^oC