

H₂S gas removal : A novel Ce(IV)/Ce(III) redox mediator

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The objective of this study was to employ the mediated electrochemical oxidation (MEO) process for the first time for the removal of H₂S from air-H₂S feed mixture, and to rationalize the efficient application of MEO process for the odor gas removal. The H₂S gas was absorbed into 3 M HNO₃ electrolyte in a laboratory made scrubber column designed for deodorization, and was oxidatively removed by the Ce(IV) mediator oxidant electrochemically generated in an electrochemical cell set-up. The integration of the electrochemical cell with the scrubber set-up ensured continuous regeneration of the mediator and its repeated reuse for H₂S removal purpose. The influences of the liquid and gas flow rates (QL from 2 to 4 L/min, QG from 30 to 70 L/min), the H₂S concentration in the H₂S-air feed mixture (5 to 15 ppm), and the Ce(III) pre-mediator concentration in the electrochemical cell (0.1 to 1 mol/L) on the H₂S removal efficiency were investigated. Both liquid and gas flow rates influenced the removal efficiencies, but in opposite directions. Nearly 98% H₂S removal was achieved as soon as the concentration of the Ce(IV) mediator ion in the flowing scrubbing liquid reached 0.1 mol/L.