

Economical DMPS synthesis method for nitric oxide treatment in flue gas

김현우, 한종인[†], 이일규

한국과학기술원

(jihun@kaist.ac.kr[†])

2,3-dimercaptopropane-1-sulfonic acid (DMPS) was synthesized as a metal chelating absorbent in wet scrubber to remove nitric oxides (NO_x) in industrial flue gas. This nitrogenous compound was difficult to remove as dissolving in water due to the low solubility (0.098 g/L of NO). Fe(II)EDTA has been widely studied as an absorbent for NO removal in wet scrubber. Although Fe(II)-based absorbent have high affinity with NO, it has a limitation that Fe(II) is easy to oxidized to Fe(III); Fe(III)EDTA cannot bind with NO. Therefore, DMPS was proposed as an alternative to EDTA, because the reduction of Fe(III)EDTA to Fe(II)EDTA is challengeable and the form of Fe(II)(DMPS)₂ is quite resistant to oxygen about 7.5 times higher than Fe(II)EDTA. DMPS was synthesized using 1 M of allyl bromide, sodium sulfite, bromine, and sodium hydrogen sulfide, and the optimal condition for synthesis was identified. The chemical composition and the functional groups of synthesized DMPS were demonstrated by FT-IR, elemental analysis, and NMR. The synthesized Fe(II)(DMPS)₂ was applied to wet scrubber, and its high removal efficiency of NO was identified as comparing with commercial DMPS.