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Oxidation of NO by in situ Fenton reaction system with dual ions as reagents

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ABSTRACT

Removal of nitrogen oxides (NO_x) is very crucial in coal-fired power plants, smelting plants and some other heavy industries. Herein, a new approach, in situ Fenton (IF) system with dual ions as reagents, was reported for the efficient oxidation removal of nitric oxide (NO). It demonstrated that the in situ Fenton (IF) system was more effective than the premixed Fenton (PF) system due to the increase of yield and utilization of (·OH) in the homogeneous reaction systems. The dual ions with Fe^{2+} and M^{n+} (M^{n+}=Ce^{3+}, Cu^{2+}, Co^{2+}, Mn^{2+}) as Fenton reagents were found to be more effective in NO oxidation than Fe^{2+} as single Fenton reagent. The obvious improvements on the oxidation efficiencies of NO were 18.85%, 16.72%, 16.58%, 16.38% in the $Fe^{2+}Ce^{3+}/H_2O_2$, $Fe^{2+}Cu^{2+}/H_2O_2$, $Fe^{2+}Mn^{2+}/H_2O_2$ and $Fe^{2+}Co^{2+}/H_2O_2$ when compared with that in Fe^{2+}/H_2O_2. The corresponding optimal molar ratios of the dual ions solution were 20%:80%, 20%:80%, 50%:50% and 50%:50% for $Fe^{2+}Ce^{3+}/H_2O_2$, $Fe^{2+}Cu^{2+}/H_2O_2$, $Fe^{2+}Mn^{2+}/H_2O_2$ and $Fe^{2+}Co^{2+}/H_2O_2$, respectively. Under the optimal conditions, the oxidation efficiencies of NO were more than 85%. The improvement of NO oxidation efficiencies in the dual ionic IF system could be ascribed to the

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