

## The Promotive Effect of Metal Ions on the Photo-Catalytic Degradation of Phenol by $\text{TiO}_2$

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The effects of additive metal ions on photo-catalytic oxidation of phenol in aqueous solution was studied on a bench scale using  $\text{TiO}_2$  and UV as the PCO system. It was considered that ferric ion ( $\text{Fe}^{3+}$ ) and ceric ion ( $\text{Ce}^{4+}$ ) could increase the efficiency of degradation of phenol in PCO reaction, only if  $\text{Fe}^{3+}$  and  $\text{Ce}^{4+}$ , as electron acceptors, could prevent the recombination of hole-electron in the surface of  $\text{TiO}_2$ . From the quantitative investigation, it was found that ferric ion increased the efficiency of degradation of aqueous phenol during PCO reaction, with concentration range of  $[\text{Fe}^{3+}] = 0.1 \sim 0.3 \text{ mM}$ . Especially, in case of 0.2 mM of ferric ion, the reaction time for the complete destruction of aqueous phenol decreased to 1/3 of the control case (i.e. 150 min  $\rightarrow$  50 min). However, ceric ion ( $\text{Ce}^{4+}$ ) was rarely effective with concentration range of  $[\text{Ce}^{4+}] = 0.02 \text{ mM}$ , but, still showed the possibility of electron acceptors.