

Effect of microwave role on NO removal with electron beam irradiation and equation derivation for predicting the amount of removed NO

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A flow process with electron beam(EB) irradiation carried out the removal of NO in air by adding microwave(MW) for the purpose of improvement of a removal efficiency of NO. The EB irradiation combined with MW irradiation was so effective in the range of NO removal efficiency of 70–80% and reduced required doses up to more than 30%, compared to the flow process without MW. On the other hand, MW irradiation was unlikely to affect the NO removal above 90% of removal efficiency. In addition, MW effect appeared definitely in the dose ranges of 8–24kGy, whereas the effect became minor below 8kGy and above 24kGy. This study found that MW irradiation was found to play an auxiliary role in NO removal with EB irradiation and the effect of MW on the NO removal is based on an intrinsic kinetic to the exclusion of a thermal effect. The concentrations of removed NO could be linearly correlated as $\Delta C = k[NO]_0 + k_0$. Where, k was proportional to dose and k_0 could be related to $k_0/D^n = aD + b$, giving n value of 0.7 without MW irradiation and 0.4 with MW irradiation, respectively.