Kinetic evaluation for aerobic biodegradation of resorcinol in a batch reactor

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Abstract: Mixed microbial cultures contained in the sludge of effluent treatment plant of a coke oven industry have been studied for its resorcinol biodegradation capacity under aerobic environment. The result showed that, after necessary acclimatisation, the culture was able to biodegrade up to a concentration of 500 mg/L of resorcinol in the substrate. The specific growth rate of microorganisms was found to be increased steadily up to 300 mg/L of resorcinol as sole carbon source, and then the rate was observed to be descended, but substrate degradation rate increases rapidly up to 400 mg/L, but decreased at 500 mg/L. The biodegradation kinetics is fitted to different substrate inhibition models. Among all models, Luong model was best fitted for resorcinol (RMSE = 0.0104). The biodegradation constants estimated using theses models showed good potential of the mixed microbial culture for resorcinol biodegradation.

Keywords: coke oven plant effluent; resorcinol biodegradation; batch reactor; substrate inhibition kinetics; kinetic constant; models.

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