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An adsorption–release–biodegradation system for simultaneous biodegradation of phenol and ammonium in phenol-rich wastewater

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Abstract:

The feasibility of simultaneous biodegradation of phenol and ammonium in phenol-rich wastewater was evaluated in a reusable system, which contained macroporous adsorption resin and *Alcaligenes faecalis* strain WY-01. In the system, up to 6000 mg/L phenol could be completely degraded by WY-01; meanwhile, $99.03 \pm 3.95\%$ of ammonium was removed from the initial concentration of 384 mg/L. This is the first study to show the capability of single strain in simultaneous removal of ammonium and phenol in wastewater containing such high concentrations of phenol. Moreover, the resin was regenerated during the biodegradation process without any additional manipulations, indicating the system was reusable. Furthermore, enzyme assay, gene expression patterns, HPLC–MS and gas chromatography analysis confirmed that phenol biodegradation accompanied with aerobic nitrifier denitrification process. Results imply that the reusable system provides a novel strategy for more efficient biodegradation of phenol and ammonium contained in some particular industrial wastewater.

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