

# Biodegradation characterisation and kinetics of *m*-cresol by *Lysinibacillus cresolivorans*

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## Abstract

A novel strain of *m*-cresol-degrading bacterium, named as *Lysinibacillus cresolivorans*, was isolated from aerobic sludge from a coking wastewater treatment plant. This bacterium is able to utilise *m*-cresol as its sole source of carbon and energy. The optimal pH for growth is 6.8 ~ 7.3 and the optimal temperature is 35°C. Compared to organic nitrogen sources, inorganic nitrogen sources were easily utilised for the *m*-cresol biodegradation. The degradation rate of *m*-cresol at different starting concentrations was analysed with zero-order kinetic characteristics. When the initial concentration of *m*-cresol was 224.2 mg·ℓ<sup>-1</sup>, the reaction rate reached a maximum at 46.80 mg·(ℓ·h)<sup>-1</sup>. The cell growth kinetics was also investigated with initial *m*-cresol concentrations varying from 0 to 1 200 mg·ℓ<sup>-1</sup>. The growth kinetics was well described by the Haldane kinetic models. The parameter values of *m*-cresol on cell growth were  $\mu_{max} = 0.89 \text{ h}^{-1}$ ,  $K_s = 426.25 \text{ mg} \cdot \text{ℓ}^{-1}$ ,  $K_i = 51.26 \text{ mg} \cdot \text{ℓ}^{-1}$ . Experiments supplementing growth with glucose indicated that this substrate increased the biomass, and also induced the biodegradation of *m*-cresol. From the results, it can be concluded that *Lysinibacillus cresolivorans* is an efficient *m*-cresol-degrading bacterium and that glucose plays multiple roles in the co-substrate condition.

**Keywords:** *m*-cresol; biodegradation; *Lysinibacillus cresolivorans*; high efficient degrading bacterium