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comparison between anodic microbial-mediated reduction and  
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## Degradation of azo dyes (Acid orange 7) in a microbial fuel cell: comparison between anodic microbial-mediated reduction and cathodic laccase-mediated oxidation

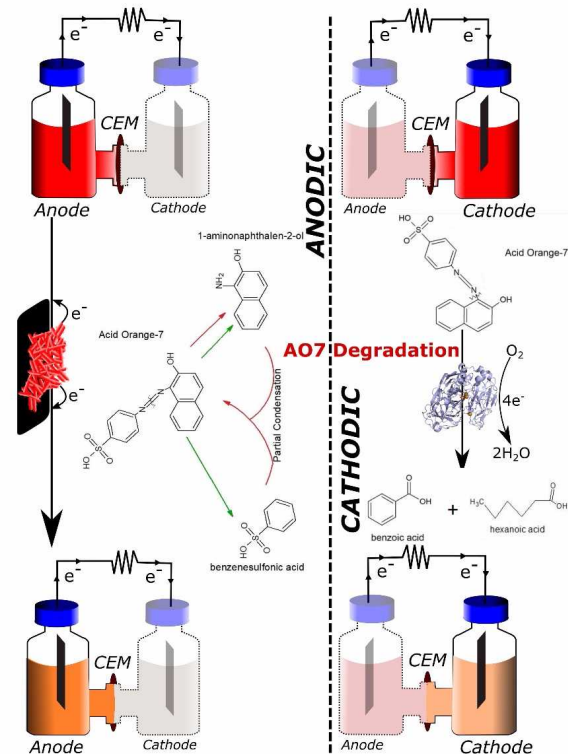
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Microbial fuel cells (MFCs) are a promising technology for the simultaneous treatment of wastewater and electricity production. With regard to azo-dye containing wastewater (e.g. from textile manufacturing), the dyes may be fed via the anode chamber containing electrochemically active bacteria or via the cathode chamber containing laccase enzyme as catalyst for oxygen reduction. This study investigated which of the two approaches is the best with regard to rate of decolourisation of the dye (Acid orange 7), COD reduction and electricity production. The power density was higher for the MFC<sub>dye at cathode</sub> (25 mW/m<sup>2</sup>, COD reduction 80%) compared with 18 mW/m<sup>2</sup> (COD reduction 69%) for MFC<sub>dye at anode</sub> (*Shewanella oneidensis* as catalyst). The decolourisation rate of the dye was not statistically significant between the two approaches with ca. 75% decolourisation achieved in 24 h. The anodic dye degradation products were unstable when exposed to air resulting in what seems to be induced diazotization and regaining of colour. In case of degradation by laccase in the cathode chamber, the decolourisation products were stable and simpler in chemical structure (e.g. presence of aliphatic compounds) as determined by GC-MS. This work suggests that feeding azo dyes in cathode chambers of MFCs containing laccase is a better way of treating the dyes than the commonly used approach of feeding the dye in the anode chamber.



Key words: Azo dyes, laccase, microbial fuel cells, decolourisation, degradation.