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Quantifying biodegradable organic matter in polluted water on the basis of coulombic yield

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ABSTRACT

Biodegradable organic matter (BOM) in polluted water plays a key role in various biological purification technologies. The five-day biochemical oxygen demand (BOD₅) index is often used to determine the amount of BOM. However, standard BOD₅ assays, centering on dissolved oxygen detection, have long testing times and often show severe deviation (error $\geq 15\%$). In the present study, the coulombic yield (Q) of a bio-electrochemical degradation process was determined, and a new index for BOM quantification was proposed. The Q value represents the quantity of transferred electrons from BOM to oxygen, and the corresponding index was defined as BOM_Q. By revealing Q-BOM stoichiometric relationship, we were able to perform a BOM_Q assay in a microbial fuel cell involved technical platform. Experimental results verified that 5–500 mg L⁻¹ of BOM_Q toward artificial wastewater samples could be directly obtained without calibration in several to dozens of hours, leaving less than 5%

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