

Electrochemical CO₂ reduction to formic acid in the heart of an urban biorefinery.

Urban waste is full of potentially valuable compounds which are currently not utilized. We present a new biorefinery concept to convert components from solid waste and waste water from an urban environment into consumer products. For this case we look at waste streams from a water treatment plant and a waste incineration plant. In the center of this biorefinery concept is the conversion of CO₂ that comes from waste water treatment to formic acid by electrochemical reduction. Waste water treatment is globally a crucial process and can be an important source of CO₂. To maximize energy efficiency we couple the electrochemical CO₂ reduction with the oxidation of impurities in waste water. The electricity needed to drive this electrochemical reduction is provided by the incineration of solid waste. We identify application areas for the sustainably produced formic acid and consider options to recycle the carbon embedded in the formic acid at the end of life.