

Title (en)
CONTINUOUS CO-CURRENT ELECTROCHEMICAL REDUCTION OF CARBON DIOXIDE

Title (de)
KONTINUIERLICHE ELEKTROCHEMISCHE GLEICHSTROM-REDUKTION VON KOHLENDIOXID

Title (fr)
REDUCTION ELECTROCHIMIQUE DE DIOXYDE DE CARBONE A COURANTS PARALLELES

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Application
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Abstract (en)
[origin: WO2007041872A1] In various embodiments, the invention provides electro-chemical processes for reduction of carbon dioxide, for example converting carbon dioxide to formate salts or formic acid. In selected embodiments, operation of a continuous reactor with a three dimensional cathode and a two-phase (gas/liquid) catholyte flow provides advantageous conditions for electro-reduction of carbon dioxide. In these embodiments, the continuous two-phase flow of catholyte solvent and carbon dioxide containing gas, in selected gas/liquid phase volume flow ratios, provides dynamic conditions that favour the electro-reduction of COs at relatively high effective superficial current densities and gas space velocities, with relatively low reactor (cell) voltages (<10 Volts). In some embodiments, relatively high internal gas hold-up in the cathode chamber (evident in an internal gas to liquid phase volume ratio > 0.1) may provide greater than equilibrium CO₂ concentrations in the liquid phase, also facilitating relatively high effective superficial current densities. In some embodiments, these characteristics may for example be achieved at catholyte pH > 7 and relatively low CO₂ partial pressures (< 10 bar). In some embodiments, these characteristics may for example be achieved under near adiabatic conditions, with catholyte outlet temperature up to about 80°C.

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