DC & AC model of an electrochemical hydrogen compressor

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**Introduction**

**Model**

Assumptions:

The cell is one dimensional;

The cell operates at a constant current density;

Features:

Pressure dependence

RH dependence

Equilibrium Potential

As the cell is symmetrical the equilibrium potential at standard conditions (E0) is 0.00 mV at all temperatures. The anode overpotential is the cathode overpotential is

Ionic Resistance

Anode and Cathode Overpotential

HOR exchange current density. Measured in PEMFC in proton pump configuration at 313K.

<http://pubs.rsc.org/-/content/articlehtml/2014/ee/c4ee00440j#fn1>

Buttler volmer kentics are assumed. Parameters are based on experimental measurements on a PEMFC running in proton pump mode to minimise mass transport effects. Operation at 313K and 100 kPa H2 on both sides using 5wt% Pt/C with a mean particle size of 2.2 nm.

α = 0.5

i0 = 216 mA cm-2

The Tafel form can be expected to hold whenever the back reaction (i.e., the anodic process, when a net reduction is considered, and vice versa) contributes less than 1% of the current, or … which implies that |TJ| > 118 mV at 25°C

AC Model