

# Chemistry 201

## Concentration cell

**NC State University**

# Concentration cell

A concentration cell consists of two identical half cells. The only difference between the half cells is that they have different concentrations of electrolyte. Typically, the maximum cell potential is quite restricted since it is often difficult to obtain cell potentials that differ by many orders of magnitude.

One important type of concentration cell is provided by a cell membrane in the mitochondrion or in the thylakoid of green plants where a  $H^+$  gradient is maintained to provide energy for life.

# Calculating a concentration cell potential using the Nernst equation

What is E for:



# Concentration cell potential using the Nernst equation

What is E for:



Step 1. Recognize that this is self-transfer reaction and  $E^\circ = 0$ . Thus, the Nernst equation becomes

$$E = -\frac{RT}{nF} \ln Q$$

This reaction is driven only by the concentration difference in the two half cells.

What is E for:



Step 2. Calculate the values

$$E = -\frac{RT}{nF} \ln Q$$

$$Q = \frac{[\text{Cu}^{2+}]}{[\text{Cu}^{2+}]} = \frac{1.25}{0.75} = 1.67$$

$$E = -\frac{(8.31)(298)}{(2)(96450)} \ln (1.67)$$

$$E = -0.0065 \text{ V}$$