

LM 37: Nonstandard Cell Potentials

Dependence
of cell
potential
on conc.

Nernst Equation

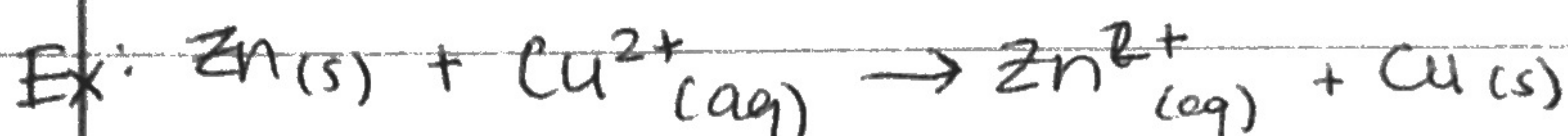
- If start out cell @ standard conditions, as chem. proceeds, conc. are changing and so is the potential.
- rxn will "go" until sys reaches equilibrium (potential = 0)

$$E = E^\circ - \frac{0.05916}{n} \log Q$$

$n \uparrow$ #mole e^-

$\frac{[\text{products}]}{[\text{reactants}]}$

Nonstandard Cell Potential



standard $E^\circ = 1.1 \text{ V}$.

$n = 2 e^-$

$$[\text{Zn}^{2+}] = .1 \text{ M}$$

$$[\text{Cu}^{2+}] = .001 \text{ M}$$

$$Q = \frac{.1}{.001} = 100 \rightarrow E = 1.1 - \frac{.05916}{2} \log(100)$$
$$E = 1.041 \text{ V}$$

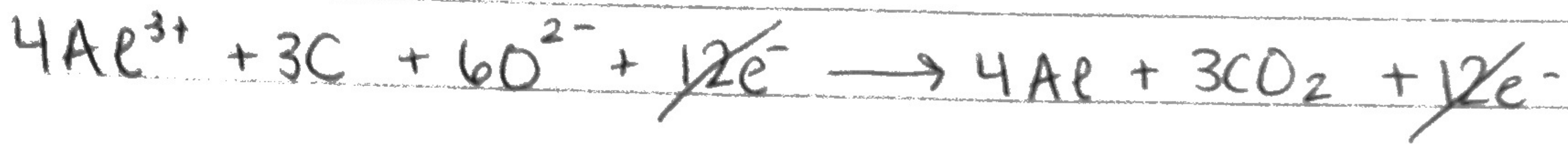
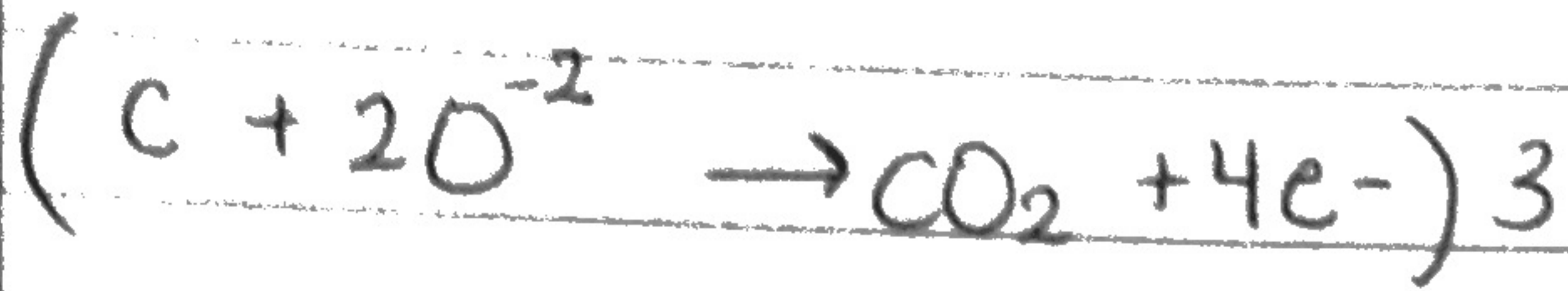
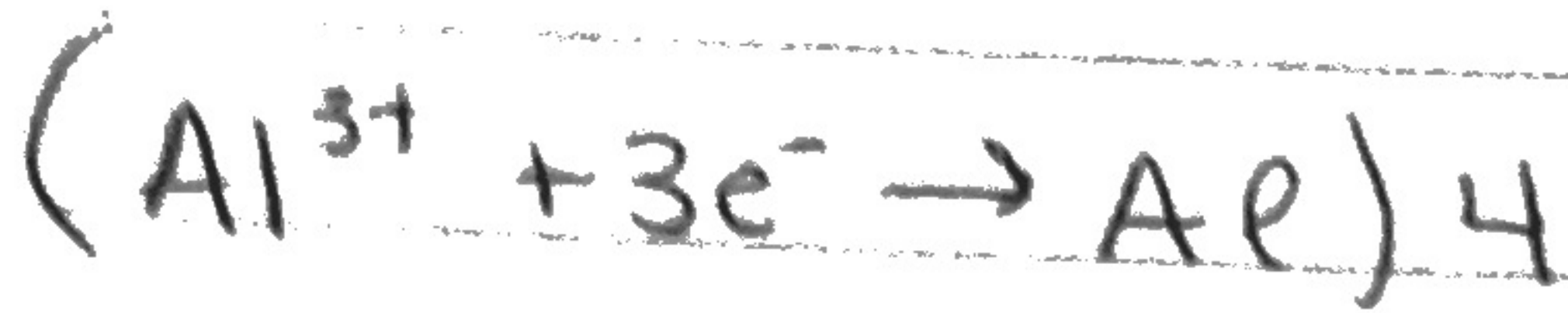
- Since the conditions are closer to equilibrium (more Zn^{2+} than Cu^{2+}) than standard conditions, cell potential is lower.

Lecture 4-24-14

- To ~~make~~ obtain reactive metals, have to make it!
- Any voltaic cell backwards is an electrolysis cell.
- To make reactive metals \rightarrow electrolysis.
 - ① voltaic cell backwards is electrolytic cell.
 - ② make reactive species from stable compounds

* put everything in one bucket
* keep products separate

Activity



96485 C	2 mol e⁻	1 mol Al	1000g	=
1 mol e ⁻	1 mol Al	27g Al	1kg	

#3 $kg\ Al \rightarrow mol\ Al \rightarrow mole\ e^- \rightarrow C \rightarrow Amps.$ = 3000 Amps.

molar mass # e⁻ Faradays constant.

#5 Electrical energy ^{solid} in kw-hr = power x time

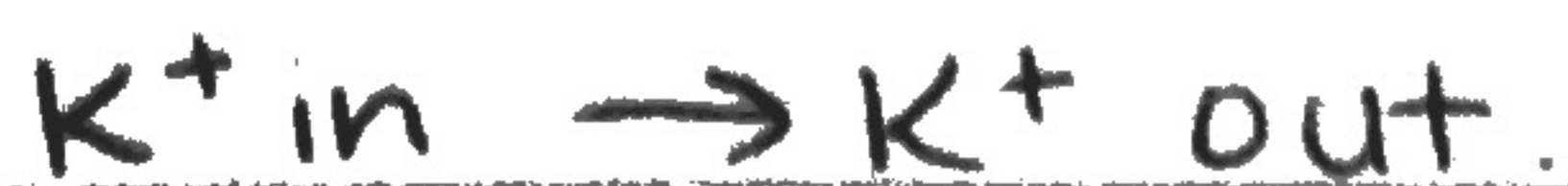
$$power = current \times voltage$$

$$= 3000 \times 5$$

$$= 15000$$

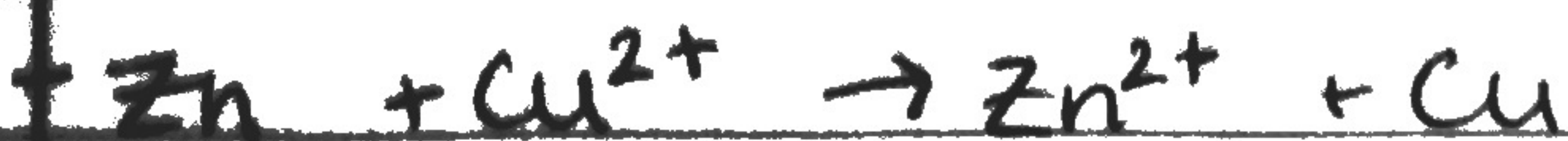
$$15\ kw \times 1\ hr = \boxed{15\ kw-hr}$$

Activity 2



potassium ions turn in to potassium ions; nothing happens... so, standard potential = 0.

There is no redox chem.; potential diff b/w inside & outside depends on conc.



If lower Zn^{2+} conc. what will happen to voltage?

* Think about LeChatelier's here.

Voltage increases