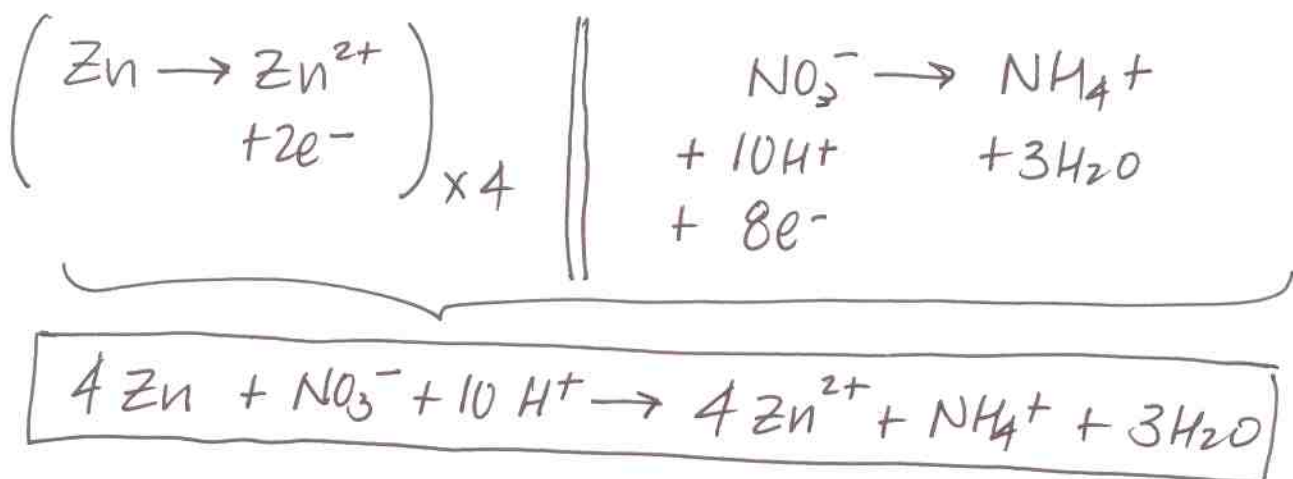
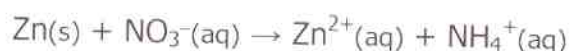


Quiz #6

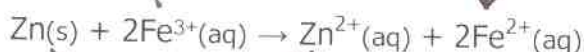
Chemistry, 7th ed., Zumdahl & Zumdahl, ch 17

Unless otherwise specified, each question is worth 4 points.

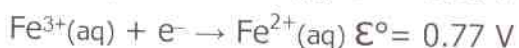
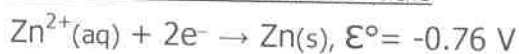
1. Balance the following oxidation-reduction reaction that occurs in an acidic solution.



2. Calculate
- \mathcal{E}°
- for the following reaction by using the standard reduction potentials provided below.



Standard Reduction Potentials



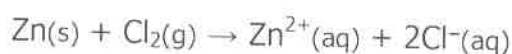
$$-(-0.76) = +0.76 \text{ V}$$

$$\mathcal{E}_{\text{cell}} = \mathcal{E}_{\text{ox}} + \mathcal{E}_{\text{red}}$$

$$= +0.76 + 0.77 = \boxed{+1.53 \text{ V}}$$

Unless otherwise specified, each question is worth 4 points.

3. Calculate E° for the following reaction using values of ΔG_f° .



$$n = 2e^-$$

$$\Delta G_f^\circ \text{ for } \text{Zn}^{2+}(\text{aq}) = -147 \text{ kJ/mol}$$

$$\Delta G_f^\circ \text{ for } \text{Cl}^-(\text{aq}) = -131 \text{ kJ/mol}$$

$$\Delta G = \text{PRODUCTS} - \text{REACTANTS}$$

$$= -147,000 + 2(-131,000) - (\phi + \phi)$$

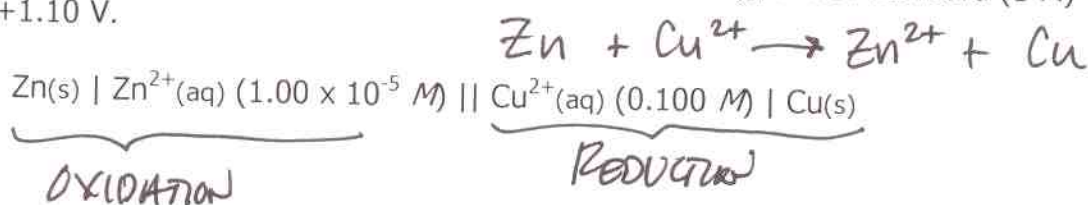
$$= -409,000 \text{ J}$$

$$\Delta G^\circ = -nFE^\circ$$

$$-409,000 = -2(96485) E^\circ$$

$$E^\circ = 2.12 \text{ V}$$

4. What is the cell potential of the following voltaic cell at 25°C? E°_{cell} under standard (1 M) conditions is +1.10 V.



$$E_{\text{cell}} = E^\circ - \frac{0.0591}{n} \log Q$$

$$= 1.10 - \frac{0.0591}{2} \log \left(\frac{1.00 \times 10^{-5}}{0.100} \right)$$

$$= 1.10 - 0.0296 \log (0.000100)$$

$$= 1.10 + \cancel{0.011} 0.118 = \boxed{1.22 \text{ V}}$$

Quiz #6Chemistry, 7th ed., Zumdahl & Zumdahl, ch 17

Unless otherwise specified, each question is worth 4 points.

(some of the) Rules for Assigning Oxidation Numbers1. *(required memorization)*2. *(required memorization)*

When F, O, or H are in compounds, they have the following oxidation numbers:

3. **fluorine = -1** (HF, CF₄...)4. **oxygen = -2** (H₂O, CO₂, CO₃²⁻...)5. **hydrogen = +1** (H₂O, NH₃...)6. *(required memorization)*7. *(required memorization)*(some of the) Rules for balancing Redox Reactions (in acidic solutions)1. *(required memorization)*

2. intermediate steps

a. balance all elements other than O & H

b. balance O with H₂Oc. balance H with H⁺d. balance charge with electrons (e⁻)3. *(required memorization)*4. *(required memorization)*Equations

$$\Delta G^\circ = -nF\mathcal{E}^\circ$$

$$\mathcal{E}_{\text{cell}} = \mathcal{E}^\circ_{\text{cell}} - (0.0591/n)\log(Q) \quad (@25^\circ\text{C})$$

$$\mathcal{E}_{\text{cell}} = \mathcal{E}^\circ_{\text{cell}} - (RT/nF)\ln(Q)$$

$$\log(K) = n\mathcal{E}^\circ/0.0591 \quad (@25^\circ\text{C})$$

Constants

$$F = 96,485 \text{ C/mol e}^-$$

$$1 \text{ A} = 1 \text{ C / sec}$$

$$1 \text{ V} = 1 \text{ J / C}$$