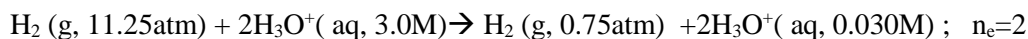
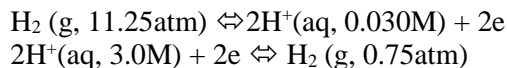


CH 102-spring 2018 Discussion Quiz 11(10 points 10 minutes)

Key

1. (8 points) This question concerns a concentration cell with positive voltage at 25 °C, constructed from hydrogen half cells of different hydronium ion concentration and sealed so that their hydrogen gas pressure can be controlled. In one half cell the hydronium concentration is 3.0 M and the hydrogen gas pressure is 0.75 atm, and in the other half cell the hydronium concentration is 0.030 M and the hydrogen gas pressure is 11.25 atm. Platinum electrodes are used to connect the cell to an external circuit.

- a. Write the line notation of the cell. Indicate for each species and its concentration or pressure.



- b. Calculate the cell voltage at 25 °C

$$E = \underline{0.15\text{V}} \text{ V}$$

$$Q = \frac{[\text{H}_2(\text{g}, 0.75\text{atm})] \cdot [\text{H}_3\text{O}^+(\text{aq}, 0.030\text{M})]^2}{[\text{H}_2(\text{g}, 11.25\text{atm})] \cdot [\text{H}_3\text{O}^+(\text{aq}, 3.0\text{M})]^2} = 6.66 \cdot 10^{-6}$$

$$E^\circ = 0\text{V}$$

$$E = E^\circ - \frac{0.05912\text{V}}{2} \log Q = -\frac{0.05912\text{V}}{2} \cdot \log(6.66 \cdot 10^{-6}) = 0.15\text{V}$$

2. (2 points) For each of the following, circle each relation that must be true.

- a. If  $Q < 1$ , then ...

2 points R or W

$$E < 0 \quad E = 0 \quad E > 0 \quad E^\circ < 0 \quad E^\circ = 0 \quad E^\circ > 0 \quad \textcircled{E > E^\circ} \quad E < E^\circ$$