

Non Sibi High School

Andover's Chem 550/580: Advanced Chemistry

Chapter 16, Review Quiz 1

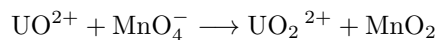
1

Determine all oxidation numbers in:

- a. As^{3-}
- b. F_2
- c. HO_2^-
- d. IO_4^-
- e. KH

2

Determine all oxidation numbers, identify the reducing agent and oxidizing agent, and balance the following equation that occurs in aqueous acidic solution using the smallest possible whole-number coefficients:



3

Rank the solid alkali metals K, Li, and Na from weakest to strongest reducing agent under standard conditions. Justify your answer using a table of standard reduction potentials.

4

Rank the aqueous cations Ag^+ , Al^{3+} , and Cd^{2+} from weakest to strongest oxidizing agent under standard conditions. Justify your answer using a table of standard reduction potentials.

5

For each spontaneous reaction below, calculate E_{cell}° and then balance the equation.

- chlorine gas + aqueous potassium bromide
- solid aluminum metal + aqueous hydrochloric acid
- solid gold metal + aqueous nitric acid
- solid zinc metal + aqueous cadmium(II) nitrate

6

A galvanic cell was constructed using a strip of nickel metal and a strip of aluminum metal, a 1 M solution of NiSO_4 and a 1 M solution of $\text{Al}(\text{NO}_3)_3$, and an aqueous solution of NaNO_3 in the salt bridge. For the spontaneous reaction that occurred, calculate E_{cell}° and ΔG° , then balance the equation. Also sketch the galvanic cell.

7

Calculate the minimum voltage required to bring about the reaction $\text{Cr}^{3+}(\text{aq}) + \text{Ag}(\text{s}) \longrightarrow \text{Cr}(\text{s}) + \text{Ag}^+(\text{aq})$ by electrolysis under standard conditions, then balance the equation.

8

For the electrolysis of molten NaI , write the half-reaction that occurs at the anode and the half-reaction that occurs at the cathode, then balance the equation.

9

- For the electrolysis of aqueous NaI , write the half-reaction that occurs at the anode and the half-reaction that occurs at the cathode, then balance the equation.
- If the electrolysis proceeds for 2.65 days using a current of 3.75 A, how many kilograms of I_2 will be produced?

10

- For the electrolysis of aqueous LiNO_3 , write the half-reaction that occurs at the anode and the half-reaction that occurs at the cathode, then balance the

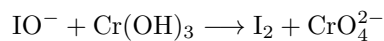
equation.

b. Using a current of 0.285 A, how many hours must the electrolysis proceed to produce 444 mL of oxygen gas, measured at 28°C and 724 torr?

c. If 40.0 milligrams of hydrogen gas are produced when the electrolysis proceeds for 18.5 minutes, calculate the current used in the electrolysis.

11

Determine all oxidation numbers, identify the reducing agent and oxidizing agent, and balance the following equation that occurs in aqueous basic solution using the smallest possible whole-number coefficients:



12

Calculate K_c for the reaction $\text{Fe}^{2+}(\text{aq}) + \text{Cd}(\text{s}) \longrightarrow \text{Cd}^{2+}(\text{aq}) + \text{Fe}(\text{s})$ at 25°C.

13

A galvanic cell is constructed at 25°C that utilizes the reaction $2\text{Fe}^{3+}(\text{aq}) + \text{Cu}(\text{s}) \longrightarrow 2\text{Fe}^{2+}(\text{aq}) + \text{Cu}^{2+}(\text{aq})$.

a. If all aqueous ions in the cell have an initial concentration of 1 M, calculate E_{cell}° .

b. Predict whether E_{cell} will increase, decrease, or remain unchanged if the initial concentration of Fe^{3+} is 1 M, but the initial concentrations of Fe^{2+} and Cu^{2+} are both changed to 0.075 M.

c. Calculate E_{cell} if the initial concentrations of all aqueous ions are 0.025 M.



This work is licensed under a
Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License
Contact: kcardozo@andover.edu