Non Sibi High School

Andover's Chem 300: Accelerated/Honors 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:

$$UO^{2+} + MnO_4^- \longrightarrow UO_2{}^{2+} + MnO_2$$

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.

a. chlorine gas + aqueous potassium bromide
b. solid aluminum metal + aqueous hydrochloric acid
c. solid gold metal + aqueous nitric acid
d. 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 $Al(NO_3)_3$, 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 $Cr^{3+}(aq) + Ag(s) \longrightarrow Cr(s) + Ag^{+}(aq)$ 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 molten NaI, if the electrolyis 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 molten KCl, using a current of 0.285 A, how many hours must the electrolysis proceed to produce 888 mL of Cl_2 gas, measured at 28°C and 724 torr?

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