AP Chem: UNIT 4 – Redox & Stoichiometry - PRACTICE Initials:_____

Hamilton H.S. 1st Trimester

1) Write balanced equations for the following redox reactions:

a. $NaBr + Cl_2 \rightarrow NaCl + Br_2$

NEXT STEP

$2Br^-_{(aq)} \rightarrow Br_{2(l)} + 2e^-$

$2Br^-_{(aq)} + Cl_{2(g)} \rightarrow 2Cl^-_{(aq)} + Br_{2(l)}$ $\quad 2e^- + Cl_{2(g)} \rightarrow 2Cl^-_{(aq)}$

NEXT STEP

$2e^- + 2Br^-_{(aq)} + Cl_{2(g)} \rightarrow 2Cl^-_{(aq)} + Br_{2(l)} + 2e^-$

$2Br^-_{(aq)} + Cl_{2(g)} \rightarrow 2Cl^-_{(aq)} + Br_{2(l)}$

LAST STEP

b. $Fe_2O_3 + CO \rightarrow Fe^{2+} + CO_2$ in acidic solution

$Fe_2O_{3(s)} \rightarrow Fe_{(aq)}$ $\quad CO_{(g)} \rightarrow CO_{2(g)}$

Reduced Oxidized

$2e^- + 6H^+ + Fe_2O_3 \rightarrow 2Fe^{2+} + 3H_2O$ $\quad H_2O + CO \rightarrow CO_2 + 2H^+ + 2e^-$

Combine

$2e^- + 6H^+ + Fe_2O_3 + H_2O + CO \rightarrow 2Fe^{2+} + 3H_2O + CO_2 + 2H^+ + 2e^-$

$4H^+ + Fe_2O_{3(s)} + CO_{(g)} \rightarrow 2Fe^{2+}_{(aq)} + 2H_2O_{(l)} + CO_{2(g)}$

c. $CO + I_2O_5 \rightarrow CO_2 + I_2$ in basic solution

$CO \rightarrow CO_2$ $\quad I_2O_5 \rightarrow I_2$

Oxidized Red.

$2OH^- + H_2O + CO \rightarrow CO_2 + 2H^+ + 2e^-$ $\quad 10OH^- + 10H^+ + I_2O_5 \rightarrow I_2 + 5H_2O + 10OH^-$

$2OH^- + H_2O + CO \rightarrow CO_2 + 2H_2O + 2e^-$ $\quad 10H_2O$

$2OH^- + CO \rightarrow CO_2 + H_2O + 2e^-$ $\quad 10e^- + 5H_2O + I_2O_5 \rightarrow I_2 + 10OH^-$

$\frac{10}{2} = 5$

$5(2OH^- + CO \rightarrow CO_2 + H_2O + 2e^-)$

$10OH^- + 5CO \rightarrow 5CO_2 + 5H_2O + 10e^-$

$10e^- + 10OH^- + 5H_2O + 5CO + I_2O_5 \rightarrow 5CO_2 + 5H_2O + I_2 + 10OH^- + 10e^-$

$5CO_{(g)} + I_2O_{5(aq)} \rightarrow 5CO_{2(g)} + I_{2(s)}$

These work out to be "perfectly" balanced. Yes, the 1st one was crazy easy. -mrm

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2) Consider the hydrocarbon pentane.

a. What is the molecular formula?

b. What is the Molar Mass?

c. Write a balanced equation for the combustion of pentane.

d. Given a density of 0.626 g/mL, calculate how much oxygen gas – in grams, is needed to burn 83.28 L of pentane.

Pentane = 5 carbons, saturated

A) C_5H_{12}

B) 72.146 g/mol C_5H_{12}

C = 12.01g x 5 = 60.05g

H = 1.008g x 12 = 12.141g

72.146 g

C) $C_5H_{12(g)} + 8O_{2(g)} \rightarrow 5CO_{2(g)} + 6H_2O_{(l)}$

D) Known: D = 0.626 g/mL Molar ratio is 1:8

$$\frac{83.28\ \text{L}\ C_5H_{12}}{} \left| \frac{1000\ \text{mL}\ C_5H_{12}}{1\ \text{L}\ C_5H_{12}} \right| \frac{0.626\ \text{g}\ C_5H_{12}}{1\ \text{mL}\ C_5H_{12}} \left| \frac{1\ \text{mol}\ C_5H_{12}}{72.146\ \text{g}\ C_5H_{12}} \right| \frac{8\ \text{mol}\ O_2}{1\ \text{mol}\ C_5H_{12}} \left| \frac{32.00\ \text{g}\ O_2}{1\ \text{mol}\ O_2} \right| =$$

184988 g O_2 ~ 1.85×10^5 g O_2