Name KEY Hour _____

Limiting Reactants #2

(Honors Chemistry)

$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

1a.)If you start with 20.5 g of C_3H_8 and 5.29 g of oxygen gas, which is the limiting reagent? **Use a BCA table!**

$20.5\,g\,C_3H_8 \times \frac{1\,mol}{44\,g} = 0.466\,mol$ $\quad 5.29\,g\,O_2 \times \frac{1\,mol}{32\,g} = 0.165\,mol$

	C_3H_8 +	$5O_2$ →	$3CO_2$ +	$4H_2O$
B	.466	.165	0	0
C	-.033	-.165	+.099	+.132
A	.433	0	.099	.132

O_2 is the limiting reactant

1b.) Using the information in question 1a, determine the number of moles of carbon dioxide that can be produced.

$9.9 \times 10^{-2}\,mol\,CO_2$

1c.) Using the information in question 1a, determine the mass of water that can be produced.

$.132\,mol\,H_2O \times \frac{18\,g}{1\,mol} = 2.38\,g\,H_2O$

1d.) Using the information in question 1a, determine the mass of the excess reagent.

$.433\,mol\,C_3H_8 \times \frac{44\,g}{1\,mol} = 1.91 \times 10^{1}\,g\,C_3H_8$ in excess

$Al_2(SO_3)_3 + 6NaOH \rightarrow 3Na_2SO_3 + 2Al(OH)_3$

2a.) If 40.5 g of aluminum sulfite reacts with 40.5 g of sodium hydroxide, what is the limiting reagent? **Use a BCA table!**

$40.5\,g\ Al_2(SO_3)_3 \times \frac{1\,mol}{294\,g} = .138\,mol$ $\qquad$ $40.5\,g\ NaOH \times \frac{1\,mol}{40\,g} = 1.01\,mol$

	$Al_2(SO_3)_3$	+ 6 NaOH	→ $3Na_2SO_3$	+ $2Al(OH)_3$
B	.138	1.01	0	0
C	-.138	-.828	+.414	+.276
A	0	.182	.414	.276

$Al_2(SO_3)_3$ is the LR

2b.) Using the information in question 2a, determine the number of moles of $Al(OH)_3$ that can be produced

.276 mol $Al(OH)_3$

2c.) Using the information in question 2a, determine the mass of sodium sulfite that can be produced.

$.414\,mol\ Na_2SO_3 \times \frac{126\,g}{1\,mol} = 5.22 \times 10^1\,g\ Na_2SO_3$

2d.) Using the information in question 2a, determine the mass of the excess reagent.

$.182\,mol\ NaOH \times \frac{40\,g}{1\,mol} =$ 7.28 g NaOH in excess

$4Al_2O_3 + 9Fe \rightarrow 3Fe_3O_4 + 8Al$

3a.) If 67.3 g of aluminum oxide is reacted with 51.4 g of iron, what is the limiting reagent? **Use a BCA table!**

$67.3\,g\ Al_2O_3 \times \frac{1\,mol}{102\,g} = .660\,mol$ $\qquad$ $51.4\,g \times \frac{1\,mol}{56\,g} = .918\,mol$

	$4Al_2O_3$	$+\ 9Fe$	$\rightarrow 3Fe_3O_4$	$+\ 8Al$
B	.660	.918	0	0
C	-.408	-.918	+.306	+.816
A	.252	0	.306	.816

Fe is the LR

3b.) Using the information in question 3a, determine the number of moles of aluminum produced.

0.816 mol Al

3c.) Using the information in question 3a, what is the mass of Fe_3O_4 that can be produced?

$.306\,mol\ Fe_3O_4 \times \frac{232\,g}{1\,mol} =$ $7.10 \times 10^1\,g\ Fe_3O_4$

3d.) Using the information in question 3a, determine the mass of the excess reagent.

$.252\,mol\ Al_2O_3 \times \frac{102\,g}{1\,mol} =$ $2.57 \times 10^1\,g\ Al_2O_3$ in excess