Stoichiometry HW #2 (B-C-A)

① $\quad 1N_2 + 3F_2 \rightarrow 2NF_3$

? mol $\qquad$ 12 g

$$12\text{ g } NF_3 \left| \frac{1\text{ mol } NF_3}{71.01\text{ g } NF_3} \right. = 0.17\text{ mol } NF_3$$

$1N_2 + 3F_2 \rightarrow 2NF_3$

B:		$\emptyset$	0.17 mol
C:		$+0.17\text{ mol}\left(\frac{3F_2}{2NF_3}\right)$	-0.17 mol
A:		0.26 mol F_2	$\emptyset$

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② $\quad 10.0\text{ g } N_2 \left| \frac{1\text{ mol } N_2}{28.02\text{ g } N_2} \right.$ $\quad 0.357\text{ mol } N_2$

$1N_2 + 3F_2 \rightarrow 2NF_3$

B:	0.357 mol		$\emptyset$
C:	-0.357 mol		$0.357\text{ mol}\left(\frac{2NF_3}{1N_2}\right)$
A:	$\emptyset$		0.714 mol NF_3

$$0.714\text{ mol } NF_3 \left| \frac{71.01\text{ g } NF_3}{1\text{ mol } NF_3} \right. = 50.7\text{ g } NF_3$$

Stoich. HW #2 (B-C-A)

(3) 4.75×10^{23} molecules CO_2 | $\frac{1 \text{ mol } CO_2}{6.02 \times 10^{23} \text{ molecules } CO_2}$

$0.789 \text{ mol } CO_2$

$2CO + O_2 \rightarrow 2CO_2$

	$2CO$	$+O_2$	$\rightarrow$	$2CO_2$
B:		$\emptyset$		0.789 mol
C:		$+0.789 \text{ mol}\left(\frac{1}{2}\right)$		-0.789
A:		$0.395 \text{ mol } O_2$		$\emptyset$

$0.395 \text{ mol } O_2$ | $\frac{22.4 \text{ L}}{1 \text{ mol } O_2}$ = **$8.85 \text{ L } O_2$**

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(4) $2.5 \text{ L } C_3H_8$ | $\frac{1 \text{ mol}}{22.4 \text{ L}} = 0.11 \text{ mol } C_3H_8$

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

	C_3H_8	$+$	$5O_2$	$\rightarrow$	$3CO_2$	$+H_2O$
B:	0.11 mol				$\emptyset$	
C:	-0.11 mol				$+0.11\left(\frac{3}{1}\right)$	
A:	$\emptyset$				$0.33 \text{ mol } CO_2$	

$0.33 \text{ mol } CO_2$ | $\frac{44.01 \text{ g}}{1 \text{ mol}} = 14.5 =$ **$15 \text{ g } CO_2$**

⑤

$$\boxed{8\,Zn + 1\,S_8 \rightarrow 8\,ZnS}$$

	$8\,Zn$	$1\,S_8$	$8\,ZnS$
B:	2.00 mol Zn	1.00 S_8	∅
C:	-2.00 mol Zn	$-2.00\text{ mol Zn}\left(\frac{1\,S_8}{8\,Zn}\right)$	$+2.00\text{ mol Zn}\left(\frac{8\,ZnS}{8\,Zn}\right)$
		−0.25 mol used	
A:	∅ mol left	1.75 mol extra S_8 (0.25 mol used)	2.00 mol ZnS

a) 2.00 mol ZnS

b) Zn limiting reactant

c) $\%\text{ Yield} = \left(\frac{\text{Actual}}{\text{Theor.}}\right) \times 100 = \left(\frac{1.00}{2.00}\right) \times 100 =$ **50.0% yield**

1.00 ← From laB

2.00 ← From work

(6) $14.7\text{g } Al_2O_3 \left| \frac{1\text{mol}}{101.96\text{g}} \right. = 0.144 \text{ mol } Al$

$10.2\text{g Fe} \left| \frac{1\text{mol}}{55.85\text{g Fe}} \right. = 0.183 \text{ mol Fe}$

	Al_2O_3	$+ 2Fe$	$\rightarrow Fe_2O_3$	$+ 2Al$
B:	0.144 mol	0.183 mol	∅	∅
C:	−0.144 mol	$-0.144\text{ mol}\left(\frac{2\text{ Fe}}{1\ Al_2O_3}\right)$ (0.288 mol ~~not enough~~)		
C:	$0.183\text{mol}\left(\frac{1\ Al_2O_3}{2\text{ Fe}}\right)$	−0.183 mol	$0.183\text{mol}\left(\frac{1}{2}\right)$	$0.183\text{mol}\left(\frac{2}{2}\right)$
	−0.0915 mol used			
A:	0.0525 mol left over	∅	0.0915 mol Fe_2O_3 made	0.183 mol Al made

a) $0.183\text{mol Al} \left| \frac{26.98\text{ g Al}}{1\text{mol Al}} \right. = \boxed{4.94\text{ g Al}}$ product made

b) limiting reactant = Fe

c) $0.0525\text{ mol } Al_2O_3 \left| \frac{101.96\text{g}}{1\text{mol}} \right. = \boxed{5.35\text{g } Al_2O_3}$ excess

d) % Yield $= \left(\frac{4.03\text{g}}{4.94\text{g}}\right) \times 100 = \boxed{81.6\%}$ Yield