① $2C_2H_2(g) + 5O_2(g) \xrightarrow{\Delta} 4CO_2(g) + 2H_2O(g)$

52.0g | 125L | ?g | ?g

@ 220°C ⇒ 493 K

.950 Atm

grams of excess Left?

1st moles

C $2 \times 12.01 = 24.02$

H $2 \times 1.008 = 2.016$

$= 26.04$

$$\left(\frac{52.0\text{ g } C_2H_2}{1}\right)\left(\frac{1\text{ mole } C_2H_2}{26.02\text{ g } C_2H_2}\right) = 2.00\text{ mole } C_2H_2$$

$PV = nRT$ $\quad n = \frac{PV}{RT}$

$P = .950$ Atm $\quad T = 493$ K

$V = 125$ L $\quad R = 0.08206 \frac{L\,Atm}{mol\,K}$

$$= \frac{(.950\text{ Atm})(125\text{ L})}{(493\text{ K})(0.08206 \frac{L\,Atm}{mol\,K})}$$

$n = 2.94$ moles O_2

	$2C_2H_2$	+ $5O_2$	→ $4CO_2$	+ $2H_2O$	
I	2.00 mole	2.94 mole	0	0	$2x = 2.00$, $x = 1.00$ or $5x = 2.94$, $x = .588$
C	$-2x$, 1.18, $-2(.588)$	$-5x$, 2.94, $-5(.588)$	$4x$, $4(.588)$	$2x$, $2(.588)$	
				1.18 mole	2.79 mole
E	0.82 excess	0 Limiting	2.35 mole		

C 1×12.01

O $2 \times 16.00 = 32.00$

44.01

$$\left(\frac{2.35\text{ mole } CO_2}{1}\right)\left(\frac{44.01\text{ g } CO_2}{1\text{ mole } CO_2}\right) = 103\text{ g } CO_2 \text{ produced}$$

16.00
2.02
18.02

$$\left(\frac{1.18\text{ mole } H_2O}{1}\right)\left(\frac{18.02\text{ g } H_2O}{1\text{ mole } H_2O}\right) = 21.3\text{ g } H_2O \text{ produced}$$

$$\left(\frac{.82\text{ mole } C_2H_2}{1}\right)\left(\frac{26.02\text{ g } C_2H_2}{1\text{ mole } C_2H_2}\right) = 21.3\text{ g } C_2H_2 \text{ excess}$$

② $Pb(SO_4)_2 + 4LiNO_3 \rightarrow Pb(NO_3)_4 + 2Li_2SO_4$

45.0g 45.0g ?g

Pb 1 207.2
S 2×32.06 = 64.12
O 9×16.00 128.00
399.3

$$\left(\frac{45.0\text{g } Pb(SO_4)_2}{1}\right)\left(\frac{1\text{ mole } Pb(SO_4)_2}{399.3\text{ g } Pb(SO_4)_2}\right) = .113\text{ mole } Pb(SO_4)_2$$

?g Excess

Li 1×6.94 6.94
N 1×14.01 14.01
O 3×16.00 48.00
68.95

$$\left(\frac{45.0\text{g } LiNO_3}{1}\right)\left(\frac{1\text{ mole } LiNO_3}{68.95\text{g } LiNO_3}\right) = .653\text{ mole } LiNO_3$$

R	$Pb(SO_4)_2$	+ $4LiNO_3$	→ $Pb(NO_3)_4$	+ $2LiSO_4$
I	.113 mole	.653 mole	0	0
C	-X	-4X	X	2X
	-.113	-.452 (-4(.113))	.113	.226 (2(.113))
E	0	.201 mole	.113 mole	.226 mole
	Limiting	Excess		

$4X = .653$
$X = .163$
$X = .113$

Li 2×6.94 13.88
1×32.06 32.06
4×16.00 64.00
109.94

$$\left(\frac{.226\text{ mole } Li_2SO_4}{1}\right)\left(\frac{109.94\text{g } LiSO_4}{1\text{ mole } LiSO_4}\right) = 24.8\text{ g } LiSO_4 \text{ Produced}$$

$$\left(\frac{.201\text{ mole } LiNO_3}{1}\right)\left(\frac{68.95\text{g } LiNO_3}{1\text{ mole } LiNO_3}\right) = 13.9\text{ g } LiNO_3 \text{ Excess}$$

③ $Pb(NO_3)_{2(aq)} + 2NaI_{(aq)} \rightarrow 2NaNO_{3(aq)} + PbI_{2(s)}$

25.0g 45.0g ?g ?g

Pb 207.2
N 2×14.01 28.02
O 6×16.00 96.00
331.22

$\left(\frac{25.0\text{g } Pb(NO_3)_2}{1}\right)\left(\frac{1\text{ mole } Pb(NO_3)_2}{331.22\text{ g } Pb(NO_3)_2}\right) = .0755\text{ mole } Pb(NO_3)_2$

$\left(\frac{45.0\text{g NaI}}{1}\right)\left(\frac{1\text{ mole NaI}}{149.90\text{g NaI}}\right) = .300\text{ mole NaI}$

Na 22.99
I 126.91
149.90

R	$Pb(NO_3)_2$	$2NaI$	$\rightarrow$	$2NaNO_3$	PbI_2	
I	.0755 mole	.300 mole		0	0	
C	$-x$	$-2x$		$2x$	x	
	$-.0755$	$-.151$ $2(.0755)$		$.151$ $2(.0755)$	.0755	$2x = .300$
E	0	.149 mole		.151 mole	.0755 mole	$x = .150$
	Limiting	Excess				

Na 22.99
N 14.01
O 3×16.00 48.00
85.00

$\left(\frac{.151\text{ mole } NaNO_3}{1}\right)\left(\frac{85.00\text{g } NaNO_3}{1\text{ mole } NaNO_3}\right) = 12.8\text{g } NaNO_3 \text{ produced}$

$\left(\frac{.0755\text{ mole } PbI_2}{1}\right)\left(\frac{461.02\text{g } PbI_2}{1\text{ mole } PbI_2}\right) = 34.8\text{g } PbI_2 \text{ Produced}$

Pb 207.2
I 2×126.91 253.82
461.02