1) $2C_2H_{2(g)} + 5O_{2(g)} \xrightarrow{\Delta} 4CO_{2(g)} + 2H_2O_{(g)}$

52.0g 125L = 179g ?g ?g

HAVE $\left(\frac{52.0g\ C_2H_2}{1}\right)\left(\frac{1\ mole\ C_2H_2}{26.0g\ C_2H_2}\right)\left(\frac{5\ mole\ O_2}{2\ mole\ C_2H_2}\right)\left(\frac{32.0g\ O_2}{1\ mole\ O_2}\right) = 160.g\ O_2$ Need

Convert L to g

$\left(\frac{125L\ O_2}{1}\right)\left(\frac{1\ mole\ O_2}{22.4L\ O_2}\right)\left(\frac{32.0g\ O_2}{1\ mole\ O_2}\right) = 179g\ O_2$

Need 160.g O2, HAVE 179g O2 so **O2 is Excess & C_2H_2 is Limiting**

HAVE 179g O2
Need 160.g O2
19g O2 Excess

start w/ Limiting

$\left(\frac{52.0g\ C_2H_2}{1}\right)\left(\frac{1\ mole\ C_2H_2}{26.0g\ C_2H_2}\right)\left(\frac{4\ mole\ CO_2}{2\ mole\ C_2H_2}\right)\left(\frac{44.0g\ CO_2}{1\ mole\ CO_2}\right) = 176g\ CO_2$

$\left(\frac{52.0g\ C_2H_2}{1}\right)\left(\frac{1\ mole\ C_2H_2}{26.0g\ C_2H_2}\right)\left(\frac{2\ mole\ H_2O}{2\ mole\ C_2H_2}\right)\left(\frac{18.0g\ H_2O}{1\ mole\ H_2O}\right) = 36.0g\ H_2O$

2) $2H_2 + O_2 \rightarrow 2H_2O$

6.4 mole 3.4 mole ?g ?g Excess

Change to grams

$\left(\frac{6.4 \text{ moles } H_2}{1}\right)\left(\frac{2.0 g H_2}{1 \text{ mole } H_2}\right) = 13 g H_2$

$\left(\frac{3.4 \text{ mole } O_2}{1}\right)\left(\frac{32.0 g O_2}{1 \text{ mole } O_2}\right) = 110 g O_2$

$2H_2 + O_2 \rightarrow 2H_2O$

13g 110g ?g

Have

$\left(\frac{13 g H_2}{1}\right)\left(\frac{1 \text{ mole } H_2}{2.0 g H_2}\right)\left(\frac{1 \text{ mole } O_2}{2 \text{ mole } H_2}\right)\left(\frac{32.0 g O_2}{1 \text{ mole } O_2}\right) = 100 g O_2 \text{ Need}$

Need $100 g O_2$, have $110 g O_2$

$110 g O_2$ Have

$100 g O_2$ Needed

$10 g O_2$ Excess

So O_2 Excess, H_2 Limiting

?g H_2O → start w/ Limiting

$\left(\frac{13 g H_2}{1}\right)\left(\frac{1 \text{ mole } H_2}{2.0 g H_2}\right)\left(\frac{2 \text{ mole } H_2O}{2 \text{ mole } H_2}\right)\left(\frac{18.0 g H_2O}{1 \text{ mole } H_2O}\right) = 120 g H_2O$

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

45.0 g $Pb(SO_4)_2$; 45.0 g $LiNO_3$; ? g ; ? g of Excess

Have

$$\left(\frac{45.0\text{ g } Pb(SO_4)_2}{1}\right)\left(\frac{1\text{ mole } Pb(SO_4)_2}{399.4\text{ g } Pb(SO_4)_2}\right)\left(\frac{4\text{ mole } LiNO_3}{1\text{ mole } Pb(SO_4)_2}\right)\left(\frac{68.9\text{ g } LiNO_3}{1\text{ mole } LiNO_3}\right)$$

$= 31.1\text{ g } LiNO_3$ Needed

Need 31.1 g $LiNO_3$, Have 45.0 g $LiNO_3$ so

$LiNO_3$ Excess
$Pb(SO_4)$ Limiting

45.0 g $LiNO_3$ Have
31.1 g $LiNO_3$ Needed

13.9 g $LiNO_3$ Excess

$$\left(\frac{13.9\text{ g } LiNO_3}{1}\right)\left(\frac{1\text{ mole } LiNO_3}{68.9\text{ g } LiNO_3}\right) = .20\text{ mole } LiNO_3 \text{ Excess}$$

Product start w/ Limiting

$$\left(\frac{45.0\text{ g } Pb(SO_4)_2}{1}\right)\left(\frac{1\text{ mole } Pb(SO_4)_2}{399.4\text{ g } Pb(SO_4)_2}\right)\left(\frac{2\text{ mole } Li_2SO_4}{1\text{ mole } Pb(SO_4)_2}\right)\left(\frac{109.9\text{ g } Li_2SO_4}{1\text{ mole } Li_2SO_4}\right)$$

$= 24.8\text{ g } Li_2SO_4$

4)

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

25.0g 45.0g ?g ?g

$\left(\frac{25.0\text{ g } Pb(NO_3)_2}{1}\right)\left(\frac{1\text{ mole } Pb(NO_3)_2}{331.2\text{ g } Pb(NO_3)_2}\right)\left(\frac{2\text{ mole NaI}}{1\text{ mole } Pb(NO_3)_2}\right)\left(\frac{149.9\text{ g NaI}}{1\text{ mole NaI}}\right) = 22.6\text{ g NaI Needed}$

45.0g NaI have
22.6g NaI needed
22.4 g NaI Excess

$Pb(NO_3)_2$ Limiting

Find Products start w/ Limiting

$\left(\frac{25.0\text{ g } Pb(NO_3)_2}{1}\right)\left(\frac{1\text{ mole } Pb(NO_3)_2}{331.2\text{ g } Pb(NO_3)_2}\right)\left(\frac{2\text{ mole } NaNO_3}{1\text{ mole } Pb(NO_3)_2}\right)\left(\frac{85.0\text{ g } NaNO_3}{1\text{ mole } NaNO_3}\right)$

$= 12.8\text{ g } NaNO_3$

$\left(\frac{25.0\text{ g } Pb(NO_3)_2}{1}\right)\left(\frac{1\text{ mole } Pb(NO_3)_2}{331.2\text{ g } Pb(NO_3)_2}\right)\left(\frac{1\text{ mole } PbI_2}{1\text{ mole } Pb(NO_3)_2}\right)\left(\frac{461.0\text{ g } PbI_2}{1\text{ mole } PbI_2}\right)$

$= 34.8\text{ g } PbI_2$