1. $LiOH + HBr \rightarrow LiBr + H_2O$

$$10g\ LiOH \times \frac{1mol\ LiOH}{23.94g} \times \frac{1mol\ LiBr}{1mol\ LiOH} \times \frac{86.845}{1mol\ LiBr} = \boxed{36.3g\ LiBr}$$

2. $C_2H_4 + 2O_2 \rightarrow 2CO_2 + 2H_2O$

$$45g\ C_2H_4 \times \frac{1mol\ C_2H_4}{28g} \times \frac{2mol\ CO_2}{1mol\ C_2H_4} \times \frac{44g}{1mol\ CO_2} = \boxed{141g\ CO_2}$$

3. $2HCl + Na_2SO_4 \rightarrow 2NaCl + H_2SO_4$

$$20g\ HCl \times \frac{1mol\ HCl}{36.45g} \times \frac{1mol\ H_2SO_4}{2mol\ HCl} \times \frac{98g}{1mol\ H_2SO_4} = \boxed{26.9g\ H_2SO_4}$$

4. $LiOH + KCl \rightarrow LiCl + KOH$

$$20g\ LiOH \times \frac{1mol\ LiOH}{23.94g} \times \frac{1mol\ LiCl}{1mol\ LiOH} \times \frac{42.39g}{1mol\ LiCl} = \boxed{35.41g\ LiCl}$$

$$\% = \frac{actual}{theory} \times 100 = \frac{6g}{35.4g} \times 100 = \boxed{16.9\%}$$

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

$$5g\ C_3H_8 \times \frac{1mol\ C_3H_8}{44g} \times \frac{4mol\ H_2O}{1mol\ C_3H_8} \times \frac{18g}{1mol\ H_2O} = \boxed{8.2g}$$

b. $\% \frac{actual}{theory} \times 100 \quad 75\% = \frac{x}{8.2g} \times 100$

$x = \boxed{6.15g\ H_2O}$

6) $Be + 2HCl \rightarrow BeCl_2 + H_2$

$$\frac{4.5g}{10.7} \times 100 = \boxed{42.1\%}$$

7) $2NaCl + CaO \rightarrow CaCl_2 + Na_2O$

$$20g\ CaO \times \frac{1mol\ CaO}{56.1g} \times \frac{1mol\ Na_2O}{1mol\ CaO} \times \frac{62g}{1mol\ Na_2O} = \boxed{22.1g\ Na_2O}$$

8) $FeBr_2 + 2KCl \rightarrow FeCl_2 + 2KBr$

$$34g\ FeBr_2 \times \frac{1mol\ FeBr_2}{215.6g} \times \frac{1mol\ FeCl_2}{1mol\ FeBr_2} \times \frac{126.74g}{1mol\ FeCl_2} = 20.g\ FeCl_2$$

$\% = \frac{actual}{theory} = \frac{4}{20} \times 100 = \boxed{20\%}$

9. $TiS + H_2O \rightarrow H_2S + TiO$

$$20g\ TiS \times \frac{1mol\ TiS}{79.867g} \times \frac{1mol\ TiO}{1mol\ TiS} \times \frac{63.867g}{1mol\ TiO} = 15.99g \qquad \frac{20g}{15.99g} \times 100 = \boxed{138\%}$$

10 $U + 3Br_2 \rightarrow UBr_6$

	H	N
U	100g	124.1g
Br_2	250g	201.4g

$$100g\,U \times \frac{1mol\,U}{238g\,U} \times \frac{3mol\,Br_2}{1mol\,U} \times \frac{159.8g}{1mol\,Br_2}$$

$$= 201.4g\,Br_2$$

$$250g\,Br_2 \times \frac{1mol\,Br_2}{159.8g} \times \frac{1mol\,U}{3mol\,Br_2} \times \frac{238g}{1mol\,U} = 124.1g\,U$$

U is limiting

$$100g\,U \times \frac{1mol\,U}{238g} \times \frac{1mol\,UBr_6}{1mol\,U} \times \frac{717.4g}{1mol\,UBr_6} = 301.4\,g$$ theortical yield

$$83\% = \frac{x}{301.4g} \times 100 \qquad x = \boxed{250.2g\,UBr_6}$$

11. $Na_2SO_3 + 2HCl \rightarrow 2NaCl + SO_2 + H_2O$

	H	N
Na_2SO_3	25.0g	38.0g
HCl	22.0g	14.5g

$$25.0g\,Na_2SO_3 \times \frac{1mol}{126g} \times \frac{2mol\,HCl}{1mol\,Na_2SO_3} \times \frac{36.46g}{1mol\,HCl} = \boxed{14.46g\,HCl}$$

$$22g\,HCl \times \frac{1mol\,HCl}{36.46g} \times \frac{1mol\,Na_2SO_3}{2mol\,HCl} \times \frac{126g}{1mol\,Na_2SO_3} = \boxed{38.0g\,Na_2SO}$$

Na_2SO_3 is limiting.

$$25.0g \times \frac{1mol\,Na_2SO_3}{126g} \times \frac{1mol\,SO_2}{1mol\,Na_2SO_3} \times \frac{64g}{1mol\,SO_2} = \boxed{12.7g\,SO_2}$$

12. $2\,TbF_3 + 3Ca \rightarrow 3CaF_2 + 2Tb$

	H	N
TbF_3	27.5g	25.00g
* Ca	6.96g	7.65g

$$27.5g\,TbF_3 \times \frac{1mol\,TbF_3}{215.914g} \times \frac{3mol\,Ca}{2mol\,TbF_3} \times \frac{40.07g}{1mol\,Ca} = 7.65g\,Ca$$

$$6.96g\,Ca \times \frac{1mol\,Ca}{40.07g} \times \frac{2mol\,TbF_3}{3mol\,Ca} \times \frac{215.914g}{1mol\,TbF_3} = 25.00g$$

Ca is limiting

a. $6.96g\,Ca \times \frac{1mol\,Ca}{40.07g} \times \frac{2mol\,Tb}{3mol\,Ca} \times \frac{158.93g}{1mol\,Tb} =$ **18.4g Tb**

b. $27.5g - 25.0g =$ **2.5g TbF_3 left**

13. $Na_2S_2O(aq) + 4Cl_2(g) + 5H_2O(aq) \rightarrow 2NaHSO_4 + 8HCl$

a. $.12mol\,Cl_2 \times \frac{1mol\,Na_2S_2O}{4mol\,Cl_2} =$ **.03 mol Na_2S_2O**

b. $.12mol\,Cl_2 \times \frac{8mol\,HCl}{4mol\,Cl_2} =$ **.24 mol HCl**

c. $.12mol\,Cl_2 \times \frac{5mol\,H_2O}{4mol\,Cl_2} =$ **.15 mol H_2O**

d. $.24mol\,HCl \times \frac{5mol\,H_2O}{8mol\,HCl} =$ **.15 mol HCl**