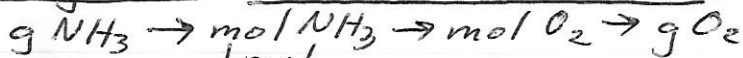*2 ways of doing each problem are shown - you should just do one of the two.

Limiting Reagents - Practice Problems

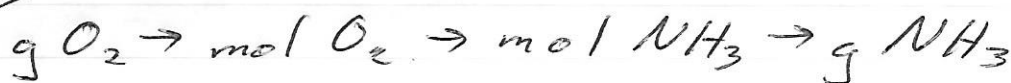g $NH_3 \rightarrow$ mol $NH_3 \rightarrow$ mol $O_2 \rightarrow$ g O_2

① 60.0 g $NH_3 \times \dfrac{1\,mol}{17.04\,g} = 3.52$ mol NH_3

3.52 mol $NH_3 \times \dfrac{1\,mol\,O_2}{1\,mol\,NH_3} = 3.52$ mol O_2

3.52 mol $O_2 \times \dfrac{32.00\,g}{1\,mol} = 112.64$ g O_2

$\rightarrow O_2$ is the limiting reagent

or

g $O_2 \rightarrow$ mol $O_2 \rightarrow$ mol $NH_3 \rightarrow$ g NH_3

40.0 g $O_2 \times \dfrac{1\,mol}{32.00\,g} = 1.25$ mol O_2

1.25 mol $O_2 \times \dfrac{1\,mol\,NH_3}{1\,mol\,O_2} = 1.25$ mol NH_3

1.25 mol $NH_3 \times \dfrac{17.04\,g}{1\,mol} = 21.3$ g NH_3

$\rightarrow NH_3$ is in excess
$\rightarrow O_2$ is the limiting reagent

② g $HCl \rightarrow$ mol $HCl \rightarrow$ mol $Mg \rightarrow$ g Mg

6.00 g $HCl \times \dfrac{1\,mol}{36.46\,g} = 0.165$ mol HCl

0.165 mol $HCl \times \dfrac{1\,mol\,Mg}{2\,mol\,HCl} = 0.0825$ mol Mg

0.0825 mol $Mg \times \dfrac{24.31\,g}{1\,mol} = 2.01$ g Mg

$\rightarrow Mg$ is in excess
$\rightarrow HCl$ is the limiting reagent

or

$$g \, Mg \rightarrow mol \, Mg \rightarrow mol \, HCl \rightarrow g \, HCl$$
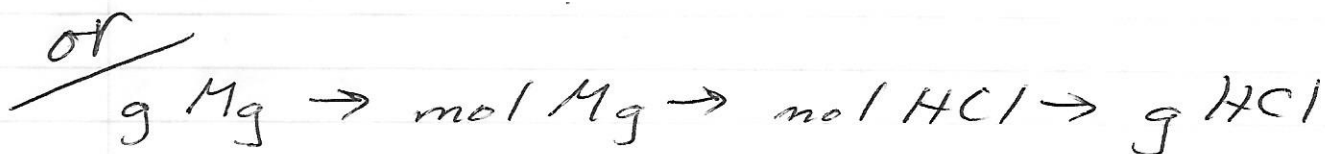
$$5.00g \, Mg \times \frac{1 \, mol}{24.31g} = 0.206 \, mol \, Mg$$

$$0.206 \, mol \, Mg \times \frac{2 \, mol \, HCl}{1 \, mol \, Mg} = 0.412 \, mol \, HCl$$

$$0.412 \, mol \, HCl \times \frac{36.46g}{1 \, mol} = 15.02g \, HCl$$

$\rightarrow$ HCl is the limiting reagent

③ $g \, CS_2 \rightarrow mol \, CS_2 \rightarrow mol \, O_2 \rightarrow g \, O_2$

$$5.00g \, CS_2 \times \frac{1 \, mol}{76.13g} = 0.066 \, mol \, CS_2$$

$$0.066 \, mol \, CS_2 \times \frac{3 \, mol \, O_2}{1 \, mol \, CS_2} = 0.198 \, mol \, O_2$$

$$0.198 \, mol \, O_2 \times \frac{32.00g}{1 \, mol} = 6.34g \, O_2$$

$\rightarrow O_2$ is in excess
$\rightarrow CS_2$ is the limiting reagent

or $g \, O_2 \rightarrow mol \, O_2 \rightarrow mol \, CS_2 \rightarrow g \, CS_2$

$$7.50g \, O_2 \times \frac{1 \, mol}{32.00g} = 0.234 \, mol \, O_2$$

$$0.234 \, mol \, O_2 \times \frac{1 \, mol \, CS_2}{3 \, mol \, O_2} = 0.078 \, mol \, CS_2$$

$$0.078 \, mol \, CS_2 \times \frac{76.13g}{1 \, mol} = 5.94 \, g \, CS_2$$

$\rightarrow CS_2$ is the limiting reagent