$2\,Mn_{(s)} + 3\,O_{2(g)} \longrightarrow 2MnO_{3(s)}$

mole ratio for the reaction is $2 : 3 : 2$ for $Mn : O_2 : MnO_3$

If 4.30kg of oxygen completely reacts with Mn to produce MnO_3 then the mass of MnO_3 produced according to the mole ratio can be calculated as:

$O_2 : MnO_3$

mole ratio $3 : 2$

3 moles of O_2 reacts to produce 3 moles of MnO_3.
hence mass of MnO_3 produced is given by.

3 moles of $O_2 \longrightarrow 4.30\text{kg}$
2 moles of $MnO_3 \longrightarrow ?$

$$\left(\frac{2\,\cancel{\text{moles}} \times 4.30\text{ kg}}{3\,\cancel{\text{moles}}}\right) = 2.87\text{ kg of } MnO_3 \text{ produced.}$$

Malar Mass

Mn — 54.94 g/mol.
MnO_3 — 102.94 g/mol.
O_2 — 15.999 g/mol.

Mass of MnO_3 in g $= 2.87\times10^{-3}$ g

Mass of Mn that reacted.

4.30kg → 3 moles of O_2.
× 2 moles of Mn

$$\left(\frac{4.30\text{kg} \times 2\text{ moles}}{3\text{ moles}}\right) = 2.87\text{kg of Mn}$$

Mass in g $= \left(\frac{2.87}{1000}\right)$ 2.87×10^{-3} g of Mn

Mass of MnO_3 in g is the same as Mass of Mn since mole ratio is same.

$$\text{Moles of } MnO_3 = \frac{\text{mass of } MnO_3\,(g)}{\text{Molar Mass}\,(g/mol)}$$

$$= \left(\frac{2.87\times10^{-3}\,g}{102.94\,g/mol}\right) = 2.788\times10^{-5} \text{ moles of } MnO_3$$

$$\text{mass in g of } O_2 = \left(\frac{4.30}{1000}\right) = 4.30\times10^{-3}\,g\ O_2$$

$$\text{Moles of } Mn = \frac{\text{Mass of } Mn\,(g)}{\text{Molar Mass}\,(g/mol)}$$

MnO_3

$$= \left(\frac{2.87\times10^{-3}\,g}{54.94\,g/mol}\right)$$

5.224 moles of Mn

Mass of O_2 = 4.30kg

$$\text{Moles of } O_2 = \left(\frac{\text{mass of } O_2\,g}{\text{molar mass}\,(g/mol)}\right)$$

$$= \left(\frac{4.30\times10^{-3}\,g}{16\,g/mol}\right)$$

$$= 2.68\times10^{-4} \text{ moles of } O_2.$$

MnO_3

$Mn : O_3$

1 : 3

$$a\begin{pmatrix} \boxed{2.87} & \boxed{4.30} \end{pmatrix} \qquad \begin{pmatrix} \boxed{0.7175} & \boxed{2.1525} \\ \hline \boxed{0.7175} & \boxed{6.4575} \end{pmatrix}$$

Starting Amount.