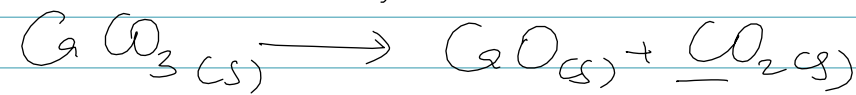


Gas laws - Stoichiometry (2)

- 1) Quicklime (CaO) can be produced by heating limestone (CaCO₃). How many L of CO₂ gas are produced at 825 °C and 754 torr from 45.8 kg CaCO₃?



45.8 kg \rightarrow find moles \rightarrow mol ratio \rightarrow L

$$45.8 \text{ kg CaCO}_3 \times \frac{1000 \text{ g}}{1 \text{ kg}} \times \frac{1 \text{ mol CaCO}_3}{100 \text{ g CaCO}_3} \times \frac{1 \text{ mol CO}_2}{1 \text{ mol CaCO}_3} = 458 \text{ mol}$$

$$PV = nRT \quad V = \frac{nRT}{P} = \frac{458 \text{ mol} \times 0.0821 \frac{\text{L atm}}{\text{mol K}} \times 1098 \text{ K}}{0.9921 \text{ atm}}$$

825 + 273 = 1098 K
 754 torr $\times \frac{1 \text{ atm}}{760 \text{ torr}} = 0.9921 \text{ atm}$

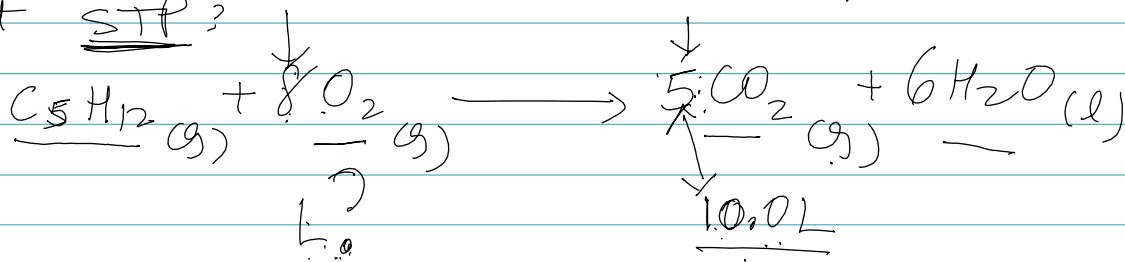
$$= 41615.5 \text{ L}$$

$$\equiv \boxed{4.16 \times 10^4 \text{ L}}$$

- 2) How many L of O₂ are consumed for every 10.0 L of CO₂ produced in the combustion of liquid pentane, C₅H₁₂ at STP?

at STP
molar volumes
are 22.4 L

~~PV = nRT~~



$$8 \text{ mol O}_2 \equiv 8 \text{ L O}_2$$

$$\text{L O}_2 = 10.0 \text{ L CO}_2 \times \frac{8 \text{ L O}_2}{5 \text{ L CO}_2} = \boxed{16.0 \text{ L CO}_2}$$