

Gas Stoichiometry - Practice Test



$$PV = nRT$$

$$n = \frac{PV}{RT} = \frac{(750 \text{ mmHg})(500 \text{ L}) \text{ mol K (1 atm)}}{(0.0821 \text{ L atm}) (378 \text{ K}) (760 \text{ mmHg})}$$

$$\underline{\underline{n = 15.1 \text{ mol CO}_2}}$$

2. $\frac{15.1 \text{ mol CO}_2}{1 \text{ mol CO}_2} \times \frac{1 \text{ mol CaO}}{1 \text{ mol CO}_2} \times (40.1 + 16) \text{ g} = \underline{\underline{847.11 \text{ g CaO}}}$

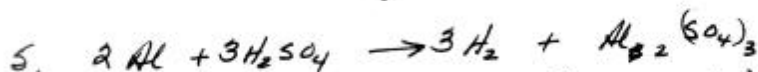
3. $F_2 = \frac{(19.0)^3 \text{ g}}{\text{mol}} = \frac{38 \text{ g}}{\text{mol}}$

$$\frac{38 \text{ g} / \text{mol}}{22.4 \text{ L}} = \underline{\underline{1.696 \text{ g/L}}}$$

4. $PV = nRT = \frac{mRT}{M}$

$$m = \frac{PVM}{RT} = \frac{(670 \text{ mmHg})(4 \text{ L})(32 \text{ g}) \text{ mol K (1 atm)}}{\text{mol} (0.0821 \text{ L atm}) (300 \text{ K}) 760 \text{ mmHg}}$$

$$\underline{\underline{m = 4.58 \text{ g O}_2}}$$



$$PV = nRT$$

$$V = \frac{nRT}{P}$$

$$V = \frac{5 \text{ g Al} / \text{mol} \times 3 \text{ mol H}_2 \times (0.0821 \text{ L atm}) (293 \text{ K}) 760 \text{ mmHg}}{27 \text{ g} / 2 \text{ mol Al} \times \text{mol K} 760 \text{ mmHg} \cdot 1 \text{ atm}}$$

$$\underline{\underline{V = 6.64 \text{ L H}_2}}$$



$$PV = nRT \quad n = \frac{PV}{RT} = \frac{(3 \text{ atm})(0.4 \text{ L}) \text{ mol K}}{(0.0821 \text{ L atm}) 293 \text{ K}} = 0.0499 \text{ mol H}_2$$

$$\frac{0.0499 \text{ mol H}_2}{1 \text{ mol H}_2} \times \frac{1 \text{ mol Mg}}{1 \text{ mol H}_2} = \underline{\underline{0.0499 \text{ mol Mg}}}$$

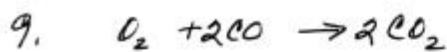


$$PV = nRT \quad V = \frac{nRT}{P}$$

$$\frac{1.5 \text{ g KClO}_3 / \text{mol} \times 3 \text{ mol O}_2 \times (0.0821 \text{ L atm}) (296 \text{ K}) 760 \text{ mmHg}}{122.6 \text{ g} / 2 \text{ mol KClO}_3 \times \text{mol K} (745 - 21.1) \text{ mmHg} (1 \text{ atm})} = \underline{\underline{0.468 \text{ L O}_2}}$$

$$8. P_1 V_1 T_2 = P_2 V_2 T_1$$

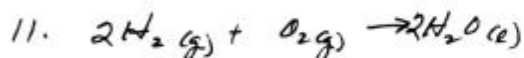
$$V_2 = \frac{P_1 V_1 T_2}{P_2 T_1} = \frac{(745-21.1) \text{ mmHg} (0.40 \text{ L}) (273 \text{ K}) (1 \text{ atm})}{(1 \text{ atm}) (296 \text{ K}) (760 \text{ mmHg})} = \underline{\underline{0.35 \text{ L O}_2 @ \text{STP}}}$$



$$\frac{1.5 \text{ L CO} / 1 \text{ CO}_2}{2 \text{ CO}} = \underline{\underline{0.75 \text{ L O}_2}}$$

$$10. \frac{\text{rate of Kr(g)}}{\text{rate of Ne(g)}} = \frac{\sqrt{M_{\text{Ne}}}}{\sqrt{M_{\text{Kr}}}} = \frac{\sqrt{20.2}}{\sqrt{83.8}} = 0.49$$

$$\text{Kr is } 0.49 \text{ Ne} \therefore \text{effusion time for Ne is } (0.49)(87.3 \text{ sec}) = \underline{\underline{42.9 \text{ sec}}}$$



$$\text{mol H}_2: n = \frac{PV}{RT} = \frac{(750 \text{ mmHg})(20.1 \text{ L}) \text{ mol} \cdot \text{K} (1 \text{ atm})}{(0.0821 \text{ L} \cdot \text{atm})(273)(760 \text{ mmHg})} = 0.885 \text{ mol H}_2$$

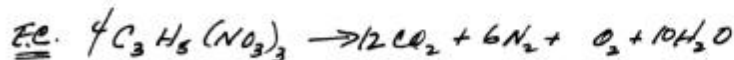
$$\text{mol O}_2: n = \frac{PV}{RT} = \frac{(720 \text{ mmHg})(11.2 \text{ L}) \text{ mol} \cdot \text{K} (1 \text{ atm})}{(0.0821 \text{ L} \cdot \text{atm})(300 \text{ K}) (760 \text{ mmHg})} = 0.431 \text{ mol O}_2$$

need 0.862 mol H_2 to use all O_2 \therefore O_2 is limiting reactant

$$\frac{0.431 \text{ mol O}_2}{0.862 \text{ mol O}_2 / 2 \text{ mol H}_2\text{O}} = \underline{\underline{0.862 \text{ mol H}_2\text{O}}} \quad \text{or} \quad \frac{(0.862 \text{ mol})(18.0 \text{ g})}{\text{mol}} = \underline{\underline{15.5 \text{ g H}_2\text{O}}}$$

$$12. \frac{1.0 \text{ g H}_2 / 1 \text{ mol}}{2.016 \text{ g}} = 0.496 \text{ mol H}_2 \quad \frac{5 \text{ g He} / 1 \text{ mol}}{4 \text{ g}} = 1.25 \text{ mol He}$$

$$PV = nRT \quad P = \frac{nRT}{V} = \frac{(0.496 + 1.25) \text{ mol} (0.0821 \text{ L} \cdot \text{atm}) (293 \text{ K})}{5.0 \text{ L}} = \underline{\underline{8.4 \text{ atm}}}$$



$$\frac{385 \text{ g nitro} / 1 \text{ mol}}{227 \text{ g}} = 1.696 \text{ mol nitro}$$

$$PV = nRT$$

$$V = \frac{nRT}{P}$$

$$\frac{1.696 \text{ mol nitro} / 12 \text{ mol CO}_2}{4 \text{ mol nitro}}$$

$$\frac{1.696 \text{ mol nitro} / 6 \text{ mol N}_2}{4 \text{ mol nitro}}$$

$$\frac{1.696 \text{ mol Nitro} / 1 \text{ mol O}_2}{4 \text{ mol nitro}}$$

$$\frac{1.696 \text{ mol Nitro} / 10 \text{ mol H}_2\text{O}}{4 \text{ mol nitro}}$$

$$V = \frac{(5.1 \text{ mol})(0.0821 \text{ L} \cdot \text{atm})(301 \text{ K})}{\text{mol} \cdot \text{K} (0.889 \text{ atm})}$$

$$V = \frac{2.54 \text{ mol} (0.0821 \text{ L} \cdot \text{atm})(301 \text{ K})}{\text{mol} \cdot \text{K} (0.889 \text{ atm})}$$

$$V = \frac{(0.424 \text{ mol})(0.0821 \text{ L} \cdot \text{atm})(301 \text{ K})}{\text{mol} \cdot \text{K} (0.889 \text{ atm})}$$

$$V = \frac{4.24 \text{ mol} (0.0821 \text{ L} \cdot \text{atm})(301 \text{ K})}{\text{mol} \cdot \text{K} (0.889 \text{ atm})}$$

$$V = 141.4 \text{ L CO}_2$$

$$V = 70.6 \text{ L N}_2$$

$$V = 11.79 \text{ L O}_2$$

$$V = 117.9 \text{ L H}_2\text{O}$$

$$\Sigma V = 341.7 \text{ L gas}$$