

# Ch. 5 Review 2015 Answers

1 of 3

$$1a) 4.32 \text{ g SO}_2\text{Cl}_2 \cdot \frac{1 \text{ mol SO}_2\text{Cl}_2}{134.96 \text{ g SO}_2\text{Cl}_2} = 0.0320 \text{ mol SO}_2\text{Cl}_2$$

$$P = \frac{nRT}{V} = \frac{0.0320 \text{ mol} \cdot 0.0821 \frac{\text{atm} \cdot \text{L}}{\text{mol} \cdot \text{K}} \cdot 400 \text{ K}}{1.50 \text{ L}} = \boxed{0.701 \text{ atm SO}_2\text{Cl}_2}$$

$$1b) P_T = P_{\text{SO}_2\text{Cl}_2}^{\leftarrow \text{left}} + P_{\text{SO}_2} + P_{\text{Cl}_2}$$

$$P_{\text{SO}_2\text{Cl}_2} = 0.701 \text{ atm} - P_{\text{SO}_2\text{Cl}_2 \text{ used up}}$$

$$\leftarrow \text{left} \downarrow P_{\text{SO}_2\text{Cl}_2} = 0.701 \text{ atm} - P_{\text{SO}_2}$$

$$P_{\text{SO}_2} = P_{\text{Cl}_2}$$

$$P_T = (0.701 - P_{\text{SO}_2}) + P_{\text{SO}_2} + P_{\text{SO}_2}$$

$$1.26 \text{ atm} = 0.701 + P_{\text{SO}_2}$$

$$\boxed{P_{\text{SO}_2} = 0.559 \text{ atm} = P_{\text{Cl}_2}}$$

$$P_{\text{SO}_2\text{Cl}_2} = 0.701 - 0.559 = \boxed{0.142 \text{ atm}}$$



$$2a) i) n = \frac{PV}{RT} = \frac{0.903 \text{ atm} \cdot 0.0822 \text{ L}}{0.0821 \frac{\text{atm} \cdot \text{L}}{\text{mol} \cdot \text{K}} \cdot 305 \text{ K}} = 0.00296 \text{ mol } \text{C}_2\text{H}_2$$

$$P = 0.950 \text{ atm} - \left(\frac{35.7}{760}\right) = 0.903$$

$$ii) 0.200 \text{ g } \text{CaCl}_2 \cdot \frac{1 \text{ mol } \text{CaCl}_2}{64.10 \text{ g } \text{CaCl}_2} \cdot \frac{1 \text{ mol } \text{C}_2\text{H}_2}{1 \text{ mol } \text{CaCl}_2} = 0.00312 \text{ mol } \text{C}_2\text{H}_2$$

$$b) \frac{0.00296}{0.00312} = 0.949 \cdot 100 = 94.9\%$$

3a) Pressures are equal, same number of moles at the same volume and temperature will yield the same pressure.

b)  $6.2 \cdot 10^{-21} \text{ J}$ , same as  $\text{N}_2$  molecules, since temp is the same.

c)  $\text{H}_2$  have higher average speed, at same temp. lighter molecules have higher average speed.  $\text{H}_2$  molar mass is 2.016 vs  $\text{N}_2$  molar mass of 28.02.

d) lower the temperature, temp is a direct measure of kinetic energy.

ei) Pressure would double, pressure and volume are inversely proportional.

eii) no change, the temperature and thus the kinetic energy stay the same



4) For  $\text{CH}_4$   $P_1 V_1 = P_2 V_2$

$$3.0 \text{ atm} \cdot 5.0 \text{ L} = 6.0 \text{ L} \cdot P_2$$

$$P_{\text{CH}_4} = 2.5 \text{ atm}$$

For  $\text{C}_2\text{H}_6$   $0.55 \text{ atm} \cdot 1.0 \text{ L} = 6.0 \text{ L} \cdot P_2$

$$P_{\text{C}_2\text{H}_6} = 0.0917 \text{ atm}$$

$$P_T = P_{\text{CH}_4} + P_{\text{C}_2\text{H}_6} = \boxed{2.59 \text{ atm}}$$