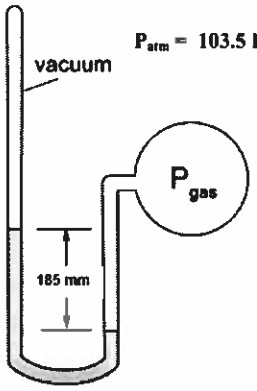
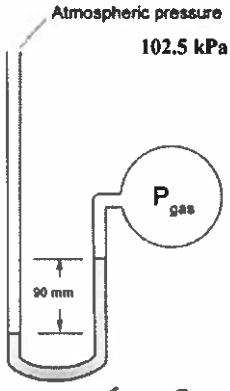
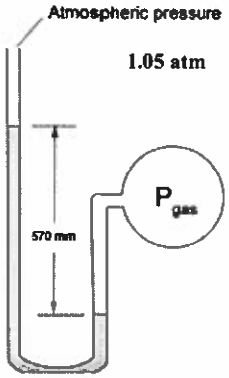
$\frac{v_1}{v_2}=\frac{\sqrt{M_2}}{\sqrt{M_1}}$ $\frac{d_1}{d_2}=\frac{\sqrt{M_2}}{\sqrt{M_1}}$ $\frac{t_1}{t_2}=\frac{\sqrt{M_1}}{\sqrt{M_2}}$ $P_1V_1=P_2V_2$ **Gases quiz v3** Name: Answers

1.00 atm = 760 mm Hg = 101.3 kPa **Show your work.** **Round to sig.figs.**

1. Calculate the pressure of the enclosed gases in each manometer below. Show your work. (6)







A) P_{gas} = 24.7 kPa B) P_{gas} = 679 mm Hg C) P_{gas} = 1.80 atm

$\frac{185\text{mmHg}}{760\text{mmHg}}=\frac{x}{101.3\text{kPa}}$ $x=24.6586=24.7$

$\frac{x}{760\text{mmHg}}=\frac{102.5\text{kPa}}{101.3\text{kPa}}$ $x=769\text{mmHg}$

$P_{gas}=P_{atm}-h$ $=769-90$ $P_{gas}=679\text{mmHg}$

$\frac{570\text{mmHg}}{760\text{mmHg}}=\frac{x}{1.00\text{atm}}$ $x=0.750\text{atm}$

$P_{gas}=P_{atm}+h$ $=1.05+0.750$ $P_{gas}=1.80$

2. Calculate the ratio of diffusion velocity of methane (CH_4) with that of hydrogen gas (H_2) at the same temperature. (State your answer in a sentence.) (2)

$\frac{V_{H_2}}{V_{CH_4}}=\sqrt{\frac{M_{CH_4}}{M_{H_2}}}=\sqrt{\frac{16.05}{2.02}}=2.81878=\boxed{2.82}$

Hydrogen diffuses 2.82 times faster than methane.

3. Helium gas diffuses 45.8 m in 10 s at a given temperature and pressure. How far would chlorine gas diffuse under the same conditions?

$\frac{d_{He}}{d_{Cl_2}}=\frac{\sqrt{M_{Cl_2}}}{\sqrt{M_{He}}}$ $\frac{45.8}{x}=\frac{\sqrt{70.90}}{\sqrt{4.00}}$ $x=10.8786\text{ m}$ $\boxed{10.9\text{m}}$

4. A gas with a volume of 32.7 mL at a pressure of 95.1 kPa is allowed to expand until the volume reaches 65.0 mL. What is the pressure at the new volume? (2)

$P_1V_1=P_2V_2$

$(95.1\text{kPa})(32.7\text{mL})=P_2(65.0\text{mL})$ $\boxed{P_2=47.8\text{kPa}}$

$P_2=47.8426\text{kPa}$