

Some answers to all Laws handout:

1) Use Boyles law: $P_1 V_1 = P_2 V_2$

$$(40)(12.3) = (60)X$$

$$8.2 \text{ L} = X$$

2) Decrease, π proportional.

3) Use Graham's law: $\frac{\text{rate}_1}{\text{rate}_2} = \frac{\sqrt{MM_2}}{\sqrt{MM_1}}$

$$\frac{1}{3} = \frac{\sqrt{X}}{\sqrt{32}}$$

$$X = 3.6 \text{ g/mol}$$

4) Use Combined law: $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

$$\frac{(800)(300)}{(296)} = \frac{(600)(X)}{(500)}$$

$$675.7 \text{ mL} = X$$

5.) must convert one of the pressures:

$$\frac{700 \text{ mmHg}}{760 \text{ mmHg}} \left| \frac{1 \text{ atm}}{760 \text{ mmHg}} \right. = 0.921 \text{ atm}$$

now use: $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

$$\frac{(0.921)(500)}{473} = \frac{(30)(X)}{293}$$

$$X = 9.5 \text{ L}$$

6.) Use Graham's law: $\frac{\text{rate}_1}{\text{rate}_2} = \frac{\sqrt{M_2}}{\sqrt{M_1}}$

$$\frac{80}{1} = \frac{\sqrt{X}}{\sqrt{2}}$$

$$X = 12,800 \text{ g/mol}$$

7.) Use: $PV = nRT$

$$(2.5)(0.100) = n(0.0821)(298)$$

↑
must be
Liters

$$n = 0.0102 \text{ moles}$$

8) Use: $PV = nRT$

$$(2.5)(37) = n(0.0821)(353)$$

$$n = 3.2 \text{ moles}$$

9.) Use: $\frac{V_1 P_1}{T_1} = \frac{V_2 P_2}{T_2}$

$$\frac{(400)(760)}{(\cancel{298})(295)} = \frac{(X)(360)}{(303)}$$

$$X = 867 \text{ mL}$$

10) Use: $P_1 V_1 = P_2 V_2$

The temperature is not relevant because it doesn't change.

$$(1)(3.6) = (2.5)(X)$$

$$1.44 \text{ L} = X$$

11) Use: $\frac{\text{rate}_1}{\text{rate}_2} = \frac{\sqrt{MM_2}}{\sqrt{MM_1}}$ $\frac{X}{1} = \frac{\sqrt{44}}{\sqrt{2}}$

$$X = 4.7 \text{ times faster}$$

12) Use: $V_1 P_1 = V_2 P_2$
 $(1.56)(1) = V(3)$

$$0.52 \text{ L} = V$$

13) Use: $\frac{V_1 P_1}{T_1} = \frac{V_2 P_2}{T_2}$

$$\frac{(85)(1200)}{363} = \frac{(350)(850)}{X}$$

$$1059 \text{ k} = X$$

14) Use: $V_1 P_1 = V_2 P_2$

$$(11.2)(0.860) = (15)(X)$$

$$0.642 \text{ atm} = X$$

15) Use: $V_1 P_1 = V_2 P_2$

$$(500)(749) = X(760)$$

$$490 \text{ mL} = X$$

16) Use: $P_1 V_1 = P_2 V_2$
 $(740)(350) = X(760)$

$$341 \text{ mL} = X$$

17) increase

18) Use: $PV = nRT$

$$(1)V = (1.27)(0.0821)(273)$$

$$V = 28.5 \text{ L}$$

19) Use: $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

$$\frac{(2230)(60)}{298} = \frac{(4560)(X)}{398}$$

$$39.2 \text{ L} = X$$

20) Use: $P_1 V_1 = P_2 V_2$ $(338)(63) = (1) X$

$$21,294 \text{ L} = X$$