Teacher Answer key

	P_1	V_1	T_1	P_2	V_2	T_2
1	1.5 atm	3.0 L	20° C = 293 K	2.5 atm	?	30° C = 303 K

$\frac{P_1 V_1 T_2}{T_1 P_2} = V_2$ $\quad \frac{1.5\text{atm} \cdot 3.0\text{L} \cdot 303\text{K}}{293\text{K} \cdot 2.5\text{atm}} = 1.86\text{ L}$

	P_1	V_1	T_1	P_2	V_2	T_2
2	600 mmHg	2.5 L	22° C = 295 K	760 mmHg	1.8 L	?

$\frac{P_2 V_2 T_1}{P_1 V_1} = T_2$ $\quad \frac{760\text{mmHg} \cdot 1.8\text{L} \cdot 295\text{K}}{600\text{mmHg} \cdot 2.5\text{L}} = 269.0\text{K}$

	P_1	V_1	T_1	P_2	V_2	T_2
3	?	750 mL	0.0° C = 273 K	2.0 atm	500 mL	25° C = 298 K

$\frac{P_2 V_2 T_1}{T_2 V_1} = P_1$ $\quad \frac{2.0\text{atm} \cdot 500\text{mL} \cdot 273\text{K}}{298\text{K} \cdot 750\text{mL}} = 1.22\text{ atm}$

	P_1	V_1	T_1	P_2	V_2	T_2
4	95 kPa	4.0 L	?	101 kPa	6.0 L	471 K or 198° C

$\frac{P_1 V_1 T_2}{P_2 V_2} = T_1$ $\quad \frac{95\text{kPa} \cdot 4.0\text{L} \cdot 471\text{K}}{101\text{kPa} \cdot 6.0\text{L}} = 295.3\text{K}$

5 A sample of oxygen gas occupies a volume of 250. mL (V_1) at 740. torr (P_1) pressure. What volume will it occupy (V_2) at 800. torr (P_2) pressure?

$\frac{V_1 P_1}{P_2} = V_2$ $\quad \frac{250\text{mL} \cdot 740\text{torr}}{800\text{torr}} = 231.3\text{ mL}$

6 A sample of carbon dioxide occupies a volume of 3.50 liters (V_1) at 125 kPa (P_1) pressure. What pressure would the gas exert if the volume was decreased to 2.00 liters (V_2)?

$\frac{P_1 V_1}{V_2} = P_2$ $\quad \frac{3.5\text{L} \cdot 125\text{kPa}}{2\text{L}} = 219\text{kPa}$

7 A 2.0 liter container of nitrogen had a pressure of 3.2 atm. What volume would be necessary to decrease the pressure to 1.0 atm?

$\frac{V_1 P_1}{P_2} = V_2$ $\quad \frac{2L \cdot 3.2atm}{1.0atm} = \boxed{6.4L}$

8 Ammonia gas occupies a volume of 450. mL at a pressure of 720. mm Hg. What volume will it occupy at standard pressure? 101.3kPa; 760mmHg; 1atm

$\frac{V_1 P_1}{P_2} = V_2$ $\quad \frac{450mL \cdot 720mmHg}{760mmHg} = \boxed{426.3mL}$

9 A 175 mL sample of neon had its pressure changed from 75 kPa to 150 kPa. What is its new volume?

$\frac{V_1 P_1}{P_2} = V_2$ $\quad \frac{175mL \cdot 75kPa}{150kPa} = \boxed{87.5mL}$

10 A sample of nitrogen occupies a volume of 250 mL at 25° C. What volume will it occupy at 95° C? $T_2 = 368K$

$\frac{V_1 T_2}{T_1} = V_2$ $\quad \frac{250mL \cdot 368K}{298K} = \boxed{308.7mL}$

11 Oxygen gas is at a temperature of 40° C when it occupies a volume of 2.3 liters. To what temperature should it be raised to occupy a volume of 6.5 liters?

$\frac{V_2 T_1}{V_1} = T_2$ $\quad \frac{6.5L \cdot 313K}{2.3L} = \boxed{884.6K}$

12 Hydrogen gas was cooled from 150° C to 50° C. Its new volume is 75 mL. What was its original volume?

$\frac{V_2 T_1}{T_2} = V_1$ $\quad \frac{75mL \cdot 423K}{323K} = \boxed{98.2mL}$

13 Chlorine gas occupies a volume of 25 mL at 300 K. What volume will it occupy at 600 K?

$\frac{V_1 T_2}{T_1} = V_2$ $\quad \frac{25mL \cdot 600K}{300K} = \boxed{50mL}$

14 A sample of neon gas at 50̄° C and a volume of 2.5 liters is cooled to 25° C. What is the new volume?

$V_1T_2 = V_2T_1$; $\frac{V_1T_2}{T_1}$

$\frac{2.5\text{L} \cdot 298\text{K}}{323\text{K}} = 2.31\text{ L}$

15 How many moles of oxygen will occupy a volume of 2.5 liters at 1.2 atm and 25° C?

PV=nRT; $n = \frac{PV}{RT}$

= 0.123 mol

16 What volume will 2.0 moles of nitrogen occupy at 720 mmHg and 20̄° C?

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

= 50.8 L

17 What pressure will be exerted by 25 g of CO_2 at a temperature of 25° C and a volume of 50̄0 mL?

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

= 27.97 atm

18 At what temperature will 5.00 g of Cl_2 exert a pressure of 900. torr at a volume of 75̄0 mL?

PV=nRT; $\frac{PV}{nR} = T$

151.4K

19 How many moles of nitrogen gas will occupy a volume of 347 mL at 6680 torr and 27° C?

PV=nRT; $n = \frac{PV}{RT}$

0.124 mole

20 What volume will 454 grams (1 lb) of hydrogen occupy at 1.05 atm and 25° C?

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

= 5236.9 L; 5.24×10^3 L