Key

The correct gas law relationship is determined by the variables given in the problem.

For each of the following problems:

- Underline key words and circle the variables in the problem
- Identify the equation used and define the variables
- Solve the problem
- Round final answers to the proper number of significant digits.

REMEMBER: Temperature must be in kelvin when solving any gas laws problem.

$K = {}^\circ C + 273$

1. A gas has an initial volume of 15 L. If the temperature increases from 330 K to 450 K, find the new volume. (V_1, T_1, T_2, V_2)

$V_1 = 15\ L$
$V_2 = ?$
$T_1 = 330\ K$
$T_2 = 450\ K$

$\frac{V_1}{T_1} = \frac{V_2}{T_2}$

$\frac{15\ L}{330\ K} = \frac{V_2}{450\ K}$

$V_2 = 20.\ L$

2. A gas exerts 1.2 atm of pressure. If the temperature is raised from 25°C to 100°C, find the new pressure. (P_1, T_1, T_2, P_2)

need to convert to K!

$P_1 = 1.2\ atm$
$P_2 = ?$
$T_1 = 25^\circ C + 273 = 298\ K$
$T_2 = 100^\circ C + 273 = 373\ K$

$\frac{P_1}{T_1} = \frac{P_2}{T_2}$

$\frac{1.2\ atm}{298\ K} = \frac{P_2}{373\ K}$

$P_2 = 1.5\ atm$

3. A sample of oxygen takes up 34 dm^3 of space when it is under 500 kPa of pressure. When the pressure is changed to 340 kPa, find the new volume. (V_1, P_1, P_2, V_2)

$P_1 = 500\ kPa$
$P_2 = 340\ kPa$
$V_1 = 34\ dm^3$
$V_2 = ?$

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

$(500\ kPa)(34\ dm^3) = (340\ kPa)(V_2)$

$50.\ dm^3 = V_2$

4. The pressure of some N_2 drops from 315 kPa to 220 kPa. If the initial volume is 1.4 L, find the new volume. (P_1, P_2, V_1, V_2)

$P_1 = 315\ kPa$
$P_2 = 220\ kPa$
$V_1 = 1.4\ L$
$V_2 = ?$

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

$(315\ kPa)(1.4\ L) = (220\ kPa)(V_2)$

$2.0\ L = V_2$

5. The pressure of neon changes from 786 mm Hg to 1811 mm Hg. If the initial temperature 87°C, what is the new temperature? (P_1, P_2, T_1, T_2)

convert to K!

$P_1 = 786\ mm\ Hg$
$P_2 = 1811\ mm\ Hg$
$T_1 = 87^\circ C + 273 = 360\ K$
$T_2 = ?$

$\frac{P_1}{T_1} = \frac{P_2}{T_2}$

$\frac{786\ mm\ Hg}{360\ K} = \frac{1811\ mm\ Hg}{T_2}$

$T_2 = 829\ K$

6. When the temperature of a gas changes, its volume decreases from 12 cm^3 to 7 cm^3. If the **final** temperature is measured to be 18°C, what was the initial temperature? (V_1, V_2, T_2, T_1)

convert to K!

$V_1 = 12\ cm^3$
$V_2 = 7\ cm^3$
$T_1 = ?$
$T_2 = 18^\circ C + 273 = 291\ K$

$\frac{V_1}{T_1} = \frac{V_2}{T_2}$

$\frac{12\ cm^3}{T_1} = \frac{7\ cm^3}{291\ K}$

$T_1 = 500.\ K$

Answers: 1. 20. L 2. 1.5 atm 3. 50 dm^3 4. 2.0 L 5. 829 K 6. 500 K