

Unit 10 – Chapter 5: Gases

Name _____

Assignment #1: Combined Gas Laws & $PV=nRT$

Period _____

- 1) A gauge on a compressed gas cylinder reads 2200 psi (pounds per square inch; 1 atm = 14.7 psi). Express this pressure in each of the following units
 - a. standard atmospheres
 - b. megapascals (MPa)
 - c. torr
- 2) A balloon is filled to a volume of 7.00×10^2 mL at a temperature of 20.0°C . The balloon is then cooled at constant pressure to a temperature of 1.00×10^2 K. What is the final volume of the balloon?
- 3) Consider the following chemical equation: $2 \text{NO}_{2(g)} \rightarrow \text{N}_2\text{O}_{4(g)}$
If 25.0 mL of NO_2 gas is completely converted to N_2O_4 gas under the same conditions, what volume will the N_2O_4 occupy?
- 4) Complete the following table for an ideal gas:

P	V	N	T
7.74×10^3 Pa	12.2 mL		25°C
	43.0 mL	0.421 mol	223 K
455 torr		4.4×10^{-2} mol	331°C
745 mm Hg	11.2 L	0.401 mol	

- 5) A flask that can withstand an internal pressure of 2500 torr, but no more, is filled with a gas at 21.0°C and 758 torr and heated. At what temperature will it burst?
- 6) A person accidentally swallows a drop of liquid oxygen, $\text{O}_{2(l)}$, which has a density of 1.149 g/mL. Assuming the drop has a volume of 0.050 mL, what volume of gas will be produced in the person's stomach at body temperature (37°C) and a pressure of 1.0 atm?
- 7) A container is filled with an ideal gas to a pressure of 40.0 atm at 0°C .
 - a. What will be the pressure in the container if it is heated to 45°C ?
 - b. At what temperature would the pressure be 1.50×10^2 atm?
 - c. At what temperature would the pressure be 25.0 atm?

- 8) A compressed gas cylinder contains 1.00×10^3 g of argon gas. The pressure inside the cylinder is 2050.0 psi (pounds per square inch) at a temperature of 18°C . How much gas remains in the cylinder if the pressure is decreased to 650.0 psi at a temperature of 26°C ?
- 9) A hot air balloon is filled with air to a volume of $4.00 \times 10^3 \text{ m}^3$ at 745 torr and 21°C . The air in the balloon is then heated to 62°C , causing the balloon to expand to a volume of $4.20 \times 10^3 \text{ m}^3$. What is the ratio of the number of moles of air in the heated balloon to the original number of moles of air in the balloon? (Hint: Openings in the balloon allow air to flow in and out. Thus, the pressure in the balloon is always the same as that of the atmosphere.)