

## Ideal Gas Law

1. How many moles of gas will be contained in a 1500 mL flask at  $-40^{\circ}\text{C}$  and 0.91 atm?

$$(0.91)(1.50) = n(0.0821)(233) \quad n = 0.071 \text{ mole}$$

2. What pressure would be exerted by 8.25g of  $\text{SO}_2$  gas at  $40^{\circ}\text{C}$  if it is contained in a 500 ml flask?

$$8.25 \text{ g SO}_2 \times \frac{\text{mole}}{64.06 \text{ g}} = 0.129 \text{ mole}$$
$$P(0.500) = (0.129)(0.0821)(313) \quad P = 6.63 \text{ atm}$$

3. At what temperature would 4.60g of  $\text{CO}_2$  occupy 275 ml at 625 mmHg of pressure?

$$4.60 \text{ g CO}_2 \times \frac{\text{mole}}{44.01 \text{ g}} = 0.105 \text{ mole}$$
$$(0.822)(0.275) = (0.105)(0.0821)T$$
$$T = 26 \text{ K}$$

4. If 4.0 moles of carbon dioxide gas is placed in a 5.00L flask at  $25^{\circ}\text{C}$ , what is the pressure in the container?

$$P(5.00) = (4.0)(0.0821)(298) \quad P = 19.6 \text{ atm}$$

5. What is the volume of 96.0g of methane gas ( $\text{CH}_4$ ) at a pressure of 3.00 atm and a temperature of  $36^{\circ}\text{C}$ ?

$$96.0 \text{ g CH}_4 \times \frac{\text{mole}}{16.04 \text{ g}} = 5.98 \text{ mole}$$
$$(3.00)(V) = (5.98)(0.0821)(309) \quad V = 50.6 \text{ L}$$

6. How many grams of nitrogen gas ( $\text{N}_2$ ) are in a 5.00 L container when the gas is under a pressure of 2.00 atm and at a temperature of  $50^{\circ}\text{C}$ ?

$$(5.00)(2.00) = n(0.0821)(323)$$
$$n = 0.377 \text{ mole N}_2 \times \frac{28.01 \text{ g}}{\text{mole}} = 10.6 \text{ g N}_2$$

7. A gas is collected in a 10.0 L cylinder with a pressure of 730 mm Hg and at  $30^{\circ}\text{C}$ . How many moles of gas are in the cylinder?

$$(10.0)(0.96) = n(0.0821)(303) \quad n = 0.386 \text{ mole}$$

8. If 31.5g of  $\text{CO}_2$  gas has a volume of 123000 mL at a pressure of 1.34 atm, what is the temperature of the gas?

$$31.5 \text{ g CO}_2 \times \frac{\text{mole}}{44.01 \text{ g}} = 0.716 \text{ mole}$$
$$(1.34)(123) = (0.716)(0.0821)T$$
$$T = 2804 \text{ K}$$