

### CONCEPT: STANDARD TEMPERATURE AND PRESSURE

- **Standard Temperature and Pressure (STP)** is a commonly used term in calculations involving gases.
  - At STP, the temperature is measured as \_\_\_\_\_ °C or \_\_\_\_\_ K and the pressure is \_\_\_\_\_.
  - Under IUPAC Rules STP, the pressure is now \_\_\_\_\_.

**EXAMPLE:** A sample of oxygen gas has a measured volume of 325 mL at STP. How many grams are present?

### STP and Volume

- **Standard Molar Volume** represents the volume of one mole of an ideal gas at STP.

Standard Molar Volume	
$V = \frac{nRT}{P} = \frac{(1 \text{ mole}) \left( 0.08206 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}} \right) ( \text{_____ K} )}{( \text{_____ atm} )} =$	<div style="border: 1px solid black; width: 100px; height: 30px;"></div>

- This relationship between moles and volume gives us the conversion factor of:

\_\_\_\_\_

**EXAMPLE:** How many moles of chlorine gas occupy a volume of 15.7 L at STP?

**CONCEPT: STANDARD TEMPERATURE AND PRESSURE**

**PRACTICE:** A sample of dichloromethane gas ( $\text{CH}_2\text{Cl}_2$ ) occupies 32.6 L at 310 K and 5.30 atm. Determine its volume at STP?

**PRACTICE:** Which gas sample has the greatest volume at STP?

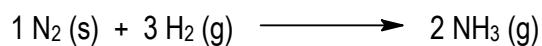
a) 10.0 g He

b) 10.0 g Ne

c) 10.0 g  $\text{N}_2$

d) All have the same volume

**PRACTICE:** Nitrogen and hydrogen combine to form ammonia via the following reaction:



What mass of nitrogen is required to completely react with 800.0 mL  $\text{H}_2$  at STP?