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 _____ ºC 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

$$V = \frac{nRT}{P} = \frac{(1\ \text{mole})\left(0.08206\ \frac{\text{L}\cdot\text{atm}}{\text{mol}\cdot\text{K}}\right)(\_\_\_\_\_\ \text{K})}{(\_\_\_\_\_\ \text{atm})} = \boxed{}$$

  - □ 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 (CH_2Cl_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 N_2 d) All have the same volume

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

$$1\ N_2\ (s)\ +\ 3\ H_2\ (g) \longrightarrow 2\ NH_3\ (g)$$

What mass of nitrogen is required to completely react with 800.0 mL H_2 at STP?