The Ideal Gas Law

STP = "Standard Temperature and Pressure"
 Standard Temperature = 273 K
 Standard Pressure = 1.00 atm = 101.325 kPa = 760 mm Hg = 760 torr
1 mL = 1 cm^3 = 1 cc
Kelvin = Celsius + 273
The Universal Gas Constant R = 8.314 L·kPa/mol·K = 0.0821 L·atm/mol·K = 62.4 L·Torr/mole·K

These problems should be done on a separate sheet of paper.

1. The book claims that the volume of one mole of an ideal gas at STP is 22.4 L. Use the Ideal Gas Law to confirm this. Show your work in the manner demonstrated by your instructor and remember to include the correct units and round off to significant digits.

For Problems 2 and 3, use the above information and your head to answer the following questions. No calculators allowed!. Remember to include the correct units.

2. What will be the volume at STP of?

A) 1 mole of gas?
B) 3 moles of gas?
C) 0.5 moles of gas?
D) 2.5 moles of gas?

3. How many moles of gas at STP will have a volume of …

A) 33.6 L?
B) 56.0 L?
C) 5.60L?
D) 112L

Please use your head, but show your work in the manner demonstrated by your instructor. Remember to include the correct units and round off to significant digits.

4. What is the volume of 2.30 mole of oxygen gas at 27.0 °C if its pressure is 1.50 atm?

5. A sample of gas is confined inside of a 500. mL flask at a temperature of 23.5°C. If the flask contains 0.0123 moles of gas, what is the pressure of this gas?

6. What temperature would be needed to confine 2.40 moles of an ideal gas to a volume of 40.0 L at a pressure of 0.95 atm?

7. How many moles of an ideal gas are in 4.75 L if the pressure is 2.25 atm and the temperature is 37°C?

8. What is the volume of 32.00 g of O_2 gas at 27°C and 0.75 atm?

9. What is the volume of 14.0 g of N_2 gas at 127°C and 105 kPa?

10. What is the volume of 25.0 g of CO_2 gas at 125°C and 750 torr?