Honors Chemistry

Boyle's Law Problems

Standard Temperature and Pressure (STP): 0°C, 1 atm (or equivalent)

760 mm Hg = 1 atm = 101.3 kPa = 760 torr

Remember to follow the general strategy:

List what you know

Set up the problem

Estimate and calculate

1. 100.0 mL of oxygen gas was collected at a pressure of 10.50 kPa. What is the gas volume if the pressure is changed to 9.91 kPa at constant temperature? (106 cm^3 O$_2$)

2. 50.0 cm^3 of hydrogen was collected at a pressure of 97.3 kPa. If the pressure is changed to 101000 Pa, what is the new volume of the gas, assuming no temperature change? (48.2 cm^3 H$_2$)

3. What is the volume of sulfur dioxide at 101.3 kPa if 500.0 cm^3 was collected at 95.6 kPa? Assume the temperature was constant. (472 cm^3 SO$_2$)

4. A weather balloon containing 2.00 m^3 of nitrogen was prepared at a pressure of 98.2 kPa. The balloon was released and came to a final volume of 2.50 m^3.. What was the final pressure of the nitrogen?

5. A flask containing 90.0 cm^3 of hydrogen was collected under a pressure of 97.5 kPa. At what pressure would the volume be 70.0 cm^3, assuming the temperature is kept constant? (125 kPa)

6. A gas has a volume of 275 cm^3 when measured at a pressure of 9.80 x 10^4 Pa. If the temperature is not changed, what would the gas volume be at standard pressure? (266 cm^3)

7. A gas has a volume of 50.0 m^3 at standard pressure. Assuming no temperature change, what volume will the gas occupy

    a) if the pressure is doubled? (25.0 m^3)

    b) If the pressure is tripled? (16.7 m^3)

    c) If the original pressure is cut in half? (1.00 x 10^2 m^3)

8. What is the volume occupied by 10.0 L of gas at standard pressure after it has been compressed at constant temperature to 500.0 kPa? (2.03 L)

9. A gas is confined in a cylinder with a movable piston at one end. When the volume of the cylinder is 760.0 mL, the pressure of the gas is 125.0 kPa. When the cylinder volume is reduced to 450.0 mL, what is the pressure? (211.1 kPa)