***Show all work; observe significant figures and units. Remember to predict first!***

1. A balloon with a volume of 5.0 L at 1.0 atm is placed in a vacuum pump. When the pump is turned on the pressure drops to 0.25 atm.

 a. Will the volume of the balloon get bigger or smaller?

 b. Calculate the new volume of the balloon.

2. A man who is standing in a valley where the pressure is 1.1 atm blows a balloon until it has a volume of 5 L. He then takes the balloon up to a high mountain peak where the pressure is 0.85 atm.

 a. Will the volume of the balloon get bigger or smaller?

 b. Calculate the new volume of the balloon.

3. A beach ball with a volume of 10.2 L at 19°C is taken outside where the temperature is 30°C.

 a. Will the volume of the ball get bigger or smaller?

 b. Calculate the new volume of the ball.

4. A balloon with a volume of 3.3 L at room temperature shrinks to 3.0 L when it is placed in an ice bath (temp = 0°C).

 a. Is the room temperature higher or lower than the ice bath?

 b. Calculate the room temperature?

5. The pressure of a gas at 75°C is 852 mm Hg. When the temperature is lowered to 12°C,

 a. Will the pressure go up or down?

 b. Calculate the new pressure.

6. A pot roast is cooking in a pressure cooker at 177°C. Room conditions are 20°C and 1 atm.

 a. Is the pressure inside the pressure cooker higher or lower than room pressure?

 b. Calculate the pressure inside the pressure cooker.

7. A 2.5L balloon is filled with helium under constant pressure at a temperature of 25°C. The temperature remains constant, but the balloon has a leak.

a. What is happening to the amount of gas in the balloon?

b. What is the volume of the balloon when half of the helium has escaped?

8. The balloon in question 7 is re-inflated to a volume of 3.8 L. What percentage of the helium remains when the volume falls to 1.5L?

9. A beach ball is filled with air in a house where the temperature is 21°C and the pressure is 780 mm Hg. It is filled to a volume of 75 L. The beach ball is then taken to the top of a mountain where the temperature is -5°C and the pressure is 740 mm Hg. Calculate the new volume of the beach ball.

10. A balloon filled with helium is in a house where the temperature is 20°C and the pressure is 750 mm Hg. It is filled to a volume of 25 L. The balloon is taken to the bottom of a valley where the temperature is 25°C and the pressure is 785 mm Hg. Calculate the new volume of the balloon.

11. How many moles of gas are in a balloon that has a volume of 19.5 L at 0.987 atm and 25°C? Given R = 0.0821 L atm/mol K.

12. What pressure will 12.0 g of oxygen gas (O2) have at 25°C and a volume of 670 mL?

13. Calculate the total pressure of a mixture of gases in which the partial pressure of carbon dioxide is 58mm, the partial pressure of nitrogen is 712 mm, and the partial pressure of oxygen is 250 mm.

14. An experiment is done in which hydrogen gas is collected over water. The total pressure of the mixture of hydrogen and water vapor is 775 mm. The partial pressure of the water is 24 mm. Calculate the partial pressure of a gas.