GAS LAWS, CONCEPTUAL MODEL

Chapter 11 continues our work with the Kinetic Molecular Theory as it relates specifically to gases. To understand and predict the behavior of a contained gas in a *quantitative* manner, we need to recognize that there are only 4 physical properties involved:

(1) Quantity of gas - usually expressed as moles, symbol *n*
(2) Volume of gas - which describes _____, symbol *V*
(3) Temperature of gas - which describes _____, symbol *T*
(4) Pressure of gas - which describes _____, symbol *P*

With your partner, consider each of the following situations. Decide how each of the four properties listed above is involved. Indicate as follows: I = increases, D = decreases, C = remains constant, no change Be prepared to share your answers with the class.

1. On a very cold day in December you take a basketball outside to shoot hoops in the driveway. After several minutes the basketball does not bounce as well. For the gas inside the ball does each property I, D, or C? Has atmospheric pressure changed during this period of time?
(1) quantity ___ (2) volume _____ (3) temperature _____ (4) pressure _____

2. On a cold autumn morning, a camper's air mattress seems flatter than it was the afternoon before. Does each property (I), (D) , or (C)?
(1) quantity _____ (2) volume _____ (3) temperature _____ (4) pressure _____

3.You notice that one of your tires seems a little flat one morning, and decide to fill it with air at a gas station. By the time you get to the gas station it looks fine, and the pressure is normal. What has happened to the air in the tire?
(1) quantity _____ (2) volume _____ (3) temperature _____ (4) pressure _____

Is the air pressure in the tire (equal to, less than , or greater than) atmospheric pressure?

4. You buy a bouquet of mylar helium balloons to surprise a friend for her (December) birthday. You leave the balloons in your car overnight and the next day they are soft and deflated. For the helium in the balloons:
(1) quantity _____ (2) volume _____ (3) temperature _____ (4) pressure _____

Is the helium pressure in the "deflated" balloons (equal to, less than, or greater than) the pressure of the atmosphere?

5. In a cryogenics lab, a scientist takes a small partially-filled balloon out of a canister of liquid nitrogen. As the balloon rests on a table, it grows in size. Evaluate each property for the gas in the balloon.
(1) quantity _____ (2) volume _____ (3) temperature _____ (4) pressure _____

6. A scuba diver has her tank filled at the dive shop one summer morning. She then leaves the tank in the trunk of her car for a few hours. For the gas in the filled scuba tank:
(1) quantity _____ (2) volume _____ (3) temperature _____ (4) pressure _____

7. One of your bike's tires has a slow leak. For the air inside the tire:
(1) quantity _____ (2) volume _____ (3) temperature _____ (4) pressure _____

If the leak continues, will all of the air come out? Explain.

8. A welder uses oxygen for the combustion reaction in his oxyacetylene torch. At the beginning of the work day the gauge of the tank indicates that the pressure of the oxygen is 2250 psi. Evaluate the oxygen at the end of the day:
(1) quantity _____ (2) volume _____ (3) temperature _____ (4) pressure _____