Unit 7 Review Name _____

SECTION 13.1 THE NATURE OF GASES

1. Explain why there is no gas pressure inside a vacuum.
2. How would the reading on a barometer change if you were to take one on a trip from Los Angeles to Lake Tahoe, which is at a much higher altitude?
3. The height of a column of mercury in a barometer is 754.3 mm. What is the atmospheric pressure in atm? In kPa?
4. How does the average kinetic energy of the helium atoms in a balloon change as the helium gas is heated from −100.0°C to 73°C?

SECTION 13.2 THE NATURE OF LIQUIDS

1. In general, how do the intermolecular attractions between particles in a gas compare with those between particles in a liquid?
2. An open beaker is about half filled with water. How can a dynamic equilibrium be established between the water and the vapor forming above its surface?
3. Explain how the following description is an analogy for evaporative cooling: If the fastest runner is removed from a race, the average speed of the remaining runners will be lower.
4. The normal boiling point of ethanol is 78.5°C. The normal boiling point of water is 100°C. At 75°C, which liquid, ethanol or water, has the greater vapor pressure? Explain.

SECTION 14.1 THE PROPERTIES OF GASES

1. Using kinetic theory, explain why a tire is more likely to blow out during a trip in the summer than during one in the winter.
2. Use kinetic theory to explain why on a cold autumn morning a camper's air mattress may appear to be somewhat flatter than when it was blown up the afternoon before. Assume no leaks.

SECTION 14.2 THE GAS LAWS

1. The volume of a gas at 155.0 kPa changes from 22.0 L to 10.0 L. What is the new pressure if the temperature remains constant?
2. Is it possible for a balloon with an initial pressure of 200.0 kPa to naturally expand to four times its initial volume when the temperature remains constant and atmospheric pressure is 101.3 kPa?
3. Exactly 10.0 L of O_2 at −25°C is heated to 100.0°C. What is the new volume if the pressure is kept constant?
4. A gas at a pressure of 501 kPa and a temperature of 25°C occupies a volume of 5.2 L. When the gas is heated to 100.0°C the volume increases to 7.00 L. What is the new pressure?
5. A sample of O_2 with an initial temperature of 50.0°C and a volume of 105 L is cooled to −25°C. The new pressure is 105.4 kPa and the new volume is 55.0 L. What was the initial pressure of the sample?

SECTION 14.3 IDEAL GASES

1. A sample of argon gas is at a pressure of 1.24×10^4 kPa and a temperature of 24°C in a rigid 25-L tank. How many moles of argon does this tank contain?
2. A 35.0-L tank contains 7.00 mol of compressed air. If the pressure inside the tank is 500.0 kPa, what is the temperature of the compressed gas?
3. How many grams of helium does a 25.0-L balloon contain at 102.0 kPa and 24°C?
4. Calculate the volume that 2.25 mol of $O_2(g)$ will occupy at STP.
5. A sample of water vapor occupies a volume of 10.5 L at 200°C and 100.0 kPa. What volume will the water vapor occupy when it is cooled to 27°C if the pressure remains constant?
6. What is the volume occupied by 0.355 mole of nitrogen gas at STP?
7. What is the volume of a container that holds 25.0 g of carbon dioxide gas at STP?

8. Under what conditions do gases behave most ideal?

9. What is the relationship between average kinetic energy and temperature?

10. Why does average kinetic energy not change during a phase change even energy may be added or removed during the process?