Gases Review

FOR EACH OF THE FOLLOWING, NAME THE GAS LAW AND SOLVE THE PROBLEM:

1. Hydrogen is collected over water at 0.975 atm and 28°C. What is the partial pressure of H2?
2. How many moles of chloroform, CHCl3, are required to fill a 253-mL flask at 100.0°C and 940 torr?
3. You want the pressure inside a bottle to be 75.0 kPa at 23°C. At what temperature in Celsius should you seal the bottle when the pressure is 1.12 atm?
4. A diver’s lungs hold about 20.0 L of air underwater at a pressure of 875 mm Hg. Assuming he holds his breath and his lungs don’t burst, what will be the volume of air in his lungs at standard pressure on the water’s surface.
5. A soccer ball containing 12.0 dm3 of gas at 21°C is left outside on a cold, winter day. What is the temperature outside in Celsius if the ball shrunk to 10,500 cm3?
6. What pressure is required to compress a gas that occupies 6500 L at 25°C and 1.0 atm to a volume of 40.0 L at 18°C?
7. Oxygen gas diffuses how many times faster than sulfur dioxide?
8. When a canning jar is sealed at 100°C the pressure inside is 101.3 kPa. What is the pressure inside the jar when it cools to room temperature, about 21°C?
9. CO2 gas is collected over water at 100.3 kPa and 19°C. Find the pressure of the dry gas.
10. A Marshmallow Peep® has a volume of about 45.0 cm3 at 101 kPa. What pressure is required to increase its size to 150.0 cm3 assuming no air escapes from the Peep®.
11. What is the temperature of a 0.00893 mol sample of neon gas that has a volume of 302 mL and a pressure of 0.941 atm?
12. A gas occupies 4.78 L at 78.1 kPa and 25°C. What will the volume be at 0.975 atm and 15°C?
13. What is the molar mass of a gas that diffuses 0.71 times as fast as oxygen?
14. A shampoo bottle contains 443 mL of air at 65°C. What is its volume when it cools to 22°C?
15. A balloon is filled with helium to a volume of 12.5 liters at 25°C and 101 kPa. How many grams of helium are in the balloon?
16. A sample of propane has a volume of 250.0 L at 125 kPa and 38°C. What volume will this sample have at 100.0 kPa and 95°C?
17. At a certain temperature and pressure, chlorine molecules have an average speed of 0.0380 m/s. What is the average speed of SO2 molecules under the same conditions?
18. The pressure in a can of hairspray is 2.50 atm at 298 K. What is the pressure in the can when it is heated to 398 K?
19. What is the molar mass of an unknown gas if it diffuses 0.906 times as fast as argon?

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ANSWER KEY

1. Dalton, 95.0 kPa
2. Ideal, 0.0099 mol
3. Gay-Lussac, 175°C
4. Boyle, 23.0 L
5. Charles, -16°C
6. Combined, 160 atm
7. Graham, 1.415
8. Gay-Lussac, 79.8 kPa
9. Dalton, 98.1 kPa
10. Boyle, 30.3 kPa
11. Ideal, 388 K
12. Combined, 3.65 L
13. Graham, 63 g/mol
14. Charles, 387 mL
15. Ideal, 2.04 g
16. Combined, 370. L
17. Graham, 0.0400 m/s
18. Gay-Lussac, 3.34 atm
19. Graham, 48.7 g/mol