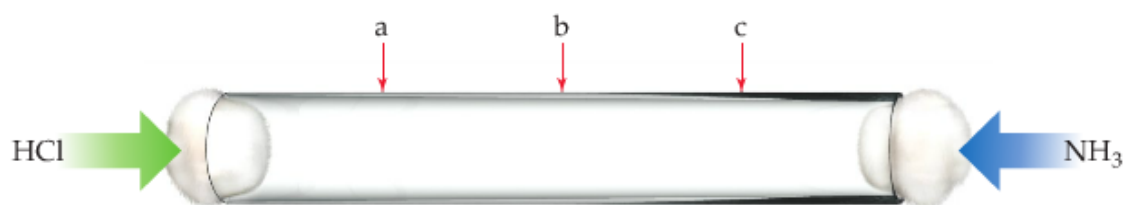


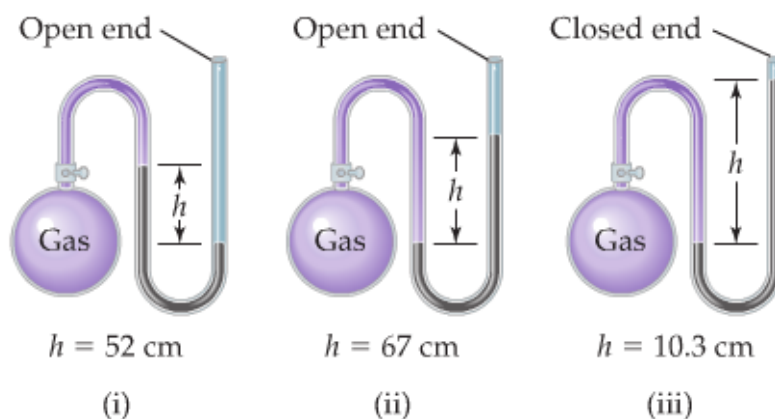
10.11 A thin glass tube 1 m long is filled with Ar gas at 1 atm, and the ends are stoppered with cotton plugs:



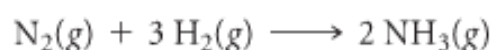
HCl gas is introduced at one end of the tube, and simultaneously NH_3 gas is introduced at the other end. When the two gases diffuse through the cotton plugs down the tube and meet, a white ring appears due to the formation of $\text{NH}_4\text{Cl}(s)$. At which location—a, b, or c—do you expect the ring to form? Explain your choice. [Section 10.8]

10.15 Suppose that a woman weighing 130 lb and wearing high-heeled shoes momentarily places all her weight on the heel of one foot. If the area of the heel is 0.50 in.^2 , calculate the pressure exerted on the underlying surface in (a) kilopascals, (b) atmospheres, and (c) pounds per square inch.

10.25 If the atmospheric pressure is 0.995 atm, what is the pressure of the enclosed gas in each of the three cases depicted in the drawing? Assume that the gray liquid is mercury.



10.30 Nitrogen and hydrogen gases react to form ammonia gas as follows:



At a certain temperature and pressure, 1.2 L of N_2 reacts with 3.6 L of H_2 . If all the N_2 and H_2 are consumed, what volume of NH_3 , at the same temperature and pressure, will be produced?

10.28 A fixed quantity of gas at 21 °C exhibits a pressure of 752 torr and occupies a volume of 5.12 L. (a) Calculate the volume the gas will occupy if the pressure is increased to 1.88 atm while the temperature is held constant. (b) Calculate the volume the gas will occupy if the temperature is increased to 175 °C while the pressure is held constant.

10.37 The Goodyear blimps, which frequently fly over sporting events, hold approximately 175,000 ft³ of helium. If the gas is at 23 °C and 1.0 atm, what mass of helium is in a blimp?

10.54 (a) Calculate the density of sulfur hexafluoride gas at 707 torr and 21 °C. (b) Calculate the molar mass of a vapor that has a density of 7.135 g/L at 12 °C and 743 torr.

10.56 The molar mass of a volatile substance was determined by the Dumas-bulb method described in Exercise 10.55. The unknown vapor had a mass of 0.846 g; the volume of the bulb was 354 cm³, pressure 752 torr, and temperature 100 °C. Calculate the molar mass of the unknown vapor.

10.90 As discussed in the “Chemistry Put to Work” box in Section 10.8, enriched uranium can be produced by gaseous diffusion of UF_6 . Suppose a process were developed to allow diffusion of gaseous uranium atoms, $\text{U}(\text{g})$. Calculate the ratio of diffusion rates for ^{235}U and ^{238}U , and compare it to the ratio for UF_6 given in the essay.

10.91 Arsenic(III) sulfide sublimes readily, even below its melting point of $320\text{ }^\circ\text{C}$. The molecules of the vapor phase are found to effuse through a tiny hole at 0.28 times the rate of effusion of Ar atoms under the same conditions of temperature and pressure. What is the molecular formula of arsenic(III) sulfide in the gas phase?