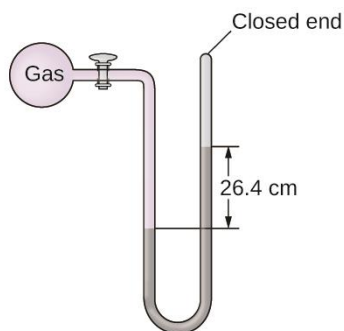


Unit 8 Problem Set

- Describe the kinetic molecular theory of gases and how it predicts the macroscopic behavior of gases
- Qualitatively predict the behavior of gases based on the simple gas laws, and perform quantitative calculations using the Ideal Gas Law
- Perform calculations for mixtures of gases using Dalton's Law and the concept of a mole fraction

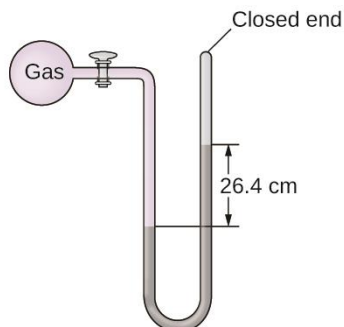
Read more about this topic: [Chapter 9](#)

1. A typical barometric pressure in Denver, Colorado, is 621.1 mm Hg. What is this pressure in atmospheres?
2. A typical barometric pressure in Denver, Colorado, is 624.7 mm Hg. What is this pressure in bar?
3. A typical barometric pressure in Denver, Colorado, is 611.7 mm Hg. What is this pressure in kPa?
4. A typical barometric pressure in Denver, Colorado, is 617.7 mm Hg. What is this pressure in psi?
5. A medical laboratory catalog describes the pressure in a cylinder of a gas as 15.52 MPa. What is this pressure in psi?
6. Answer each of the following questions referencing this manometer

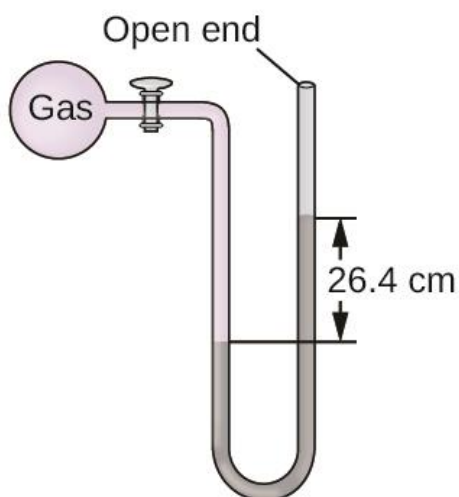


- a. The pressure of a sample of gas is measured at sea level with a closed-end manometer. The liquid in the manometer is mercury. Assuming atmospheric pressure is 760.0 mm Hg, determine the pressure of the gas in torr.
 - b. The pressure of a sample of gas is measured at sea level with a closed-end manometer. The liquid in the manometer is mercury. Assuming atmospheric pressure is 760.0 mm Hg, determine the pressure of the gas in atm.
7. Answer each of the following questions referencing this manometer

Unit 8 Problem Set



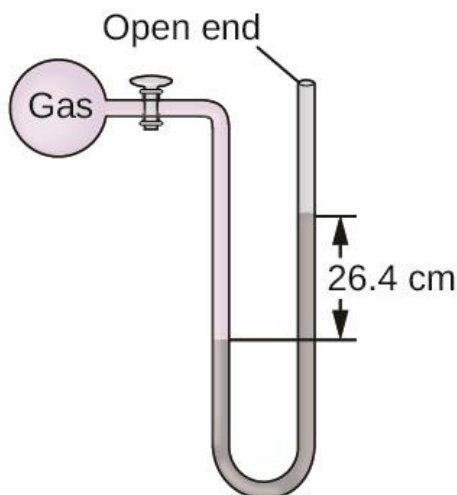
- The pressure of a sample of gas is measured at sea level with a closed-end manometer. The liquid in the manometer is mercury. Assuming atmospheric pressure is 760.0 mm Hg, determine the pressure of the gas in kPa.
 - The pressure of a sample of gas is measured at sea level with a closed-end manometer. The liquid in the manometer is mercury. Assuming atmospheric pressure is 760.0 mm Hg, determine the pressure of the gas in bar.
8. Answer each of the following questions referencing this manometer



- The pressure of a sample of gas is measured at sea level with an open-end manometer. The liquid in the manometer is mercury. Assuming atmospheric pressure is 760.0 mm Hg, determine the pressure of the gas in torr.
- The pressure of a sample of gas is measured at sea level with an open-end manometer. The liquid in the manometer is mercury. Assuming atmospheric pressure is 760.0 mm Hg, determine the pressure of the gas in atm

Unit 8 Problem Set

9. Answer each of the following questions referencing this manometer



- The pressure of a sample of gas is measured at sea level with a open-end manometer. The liquid in the manometer is mercury. Assuming atmospheric pressure is 760.0 mm Hg, determine the pressure of the gas in kPa
 - The pressure of a sample of gas is measured at sea level with a open-end manometer. The liquid in the manometer is mercury. Assuming atmospheric pressure is 760.0 mm Hg, determine the pressure of the gas in bar
10. A spray can is used until it is empty except for the propellant gas, which has a pressure of 1,351 torr at 24.7 °C. If the can is thrown into a fire ($T = 464\text{ °C}$), what will be the pressure in the hot can (in torr)?
11. A balloon inflated with 7 breaths of air has a volume of 2.3 L. At the same temperature and pressure, what is the volume of the balloon if 3 more same-sized breaths are added to the balloon?
12. How many grams of CO_2 are present if a 0.101 L vessel of gas is at 302 torr and 26 °C?
[Watch a video of a similar problem](#)
13. How many grams of C_2H_4 are present if a 8.83 L vessel of gas is at 382 kPa and 25 K?
[Watch a video of a similar problem](#)
14. How many grams of Ar are present if a 211 mL vessel of gas is at 253.01 mm Hg and -50.6 °C?
[Watch a video of a similar problem](#)
15. While resting, the average 70-kg human consumes 13.83 L of pure O_2 per hour at 25.0 °C and 100.0 kPa. How many moles of O_2 are consumed by a 70 kg person while resting for 1.0 h?
16. What is the molar mass of a gas if 0.294 g of the gas occupies a volume of 122 mL at a temperature 138 °C and a pressure of 767 torr?
[Watch a video of a similar problem](#)
17. A sample of gas isolated from unrefined petroleum contains 90.0% CH_4 , 8.9% C_2H_6 , and 1.1% C_3H_8 at a total pressure of 305.1 kPa. What is the pressure (in kPa) of CH_4 in the sample?
18. What volume (in L) of oxygen at 148 °C and a pressure of 127.8 kPa is produced by the decomposition of 131.6 g of BaO_2 to BaO and O_2 ?

Unit 8 Problem Set

19. A balloon filled with helium gas takes 4.4 hours to deflate to 30% of its original volume. How long will it take for an identical balloon filled with the same volume of hydrogen gas (instead of helium) to decrease its volume by 30%?
20. A gas of unknown identity diffuses at a rate of 84.2 mL/s in a diffusion apparatus in which carbon dioxide diffuses at the rate of 109 mL/s. Calculate the molecular mass of the unknown gas.