

CLE 3321.2.4 Investigate characteristics associated with the gaseous state.

SPI 3221.2.7 Predict how changes in volume, temperature, and pressure affect the behavior of a gas.

Chemistry Boyle's and Charles's Laws Practice Problems

Boyle's Law - volume and pressure changes at constant temperature

1. Bacteria produce methane gas in sewage-treatment plants. This gas is often captured or burned. If a bacterial culture produces 60.0 mL of methane gas at 700.0 mm Hg, what volume would be produced at 760.0 mm Hg?
2. A gas has a pressure of 1.26 atm and occupies a volume of 7.40 L. If the gas is compressed to a volume of 2.93 L, what will its pressure?
3. Hospitals buy 400-L cylinders of oxygen gas compressed at 150 atm. They administer oxygen to patients at 3.0 atm in a hyperbaric oxygen chamber. What volume of oxygen can a cylinder supply at this pressure?

Charles's Law - volume and temperature changes at constant pressure

4. A balloon is filled with 3.0 L of helium at 310 K. The balloon is placed in an oven where the temperature reaches 340 K. What is the new volume of the balloon?
5. A gas at 65 °C occupies 4.22 L. At what Celsius temperature will the volume be 3.87 L?
6. A 4.0 L sample of methane gas is collected at 30.0 °C. Predict the volume of the sample at 0 °C.

Mixed Review

7. The volume of a scuba tank is 10.0 L. It contains a mixture of nitrogen and oxygen at 290. atm. What volume of this mixture could the tank supply to a diver at 2.40 atm?
8. A helium-filled balloon has a volume of 2.75 L at 20. °C. The volume of the balloon decreases to 2.46 L after it is placed outside on a cold day. What is the outside temperature in °C?
9. A 25 L sample of nitrogen is heated from 110 °C to 260 °C. What volume will the sample occupy at the higher temperature?
10. A 1.00 L balloon is filled with helium at 1.20 atm. If the balloon is squeezed into a 0.500 L beaker and doesn't burst, what is the pressure of the helium?

Boyle's and Charles's Laws Practice Problems Answer Key

1. 55.3 mL
2. 3.18 atm
3. 20 000 L
4. 3.3 L
5. 37 °C
6. 3.6 L
7. 1210 L
8. -11°C
9. 35 L
10. 2.40 atm