

Gas Law Worksheet II

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1. In a certain experiment a sample of helium in a vacuum system was compressed at 25 °C from a volume of 200.0 mL to a volume of 0.240 mL where its pressure was found to be 30.0 mm Hg. What was the original pressure of the helium?
2. A hydrogen gas volume thermometer has a volume of 100.0 cm³ when immersed in an ice-water bath at 0 °C. When immersed in boiling liquid chlorine, the volume of the hydrogen at the same pressure is 87.2 cm³. Find the temperature of the boiling point of chlorine in °C.
3. 2.50 grams of XeF₄ is introduced into an evacuated 3.00 liter container at 80.0 °C. Find the pressure in atmospheres in the container.
4. A lighter-than-air balloon is designed to rise to a height of 6 miles at which point it will be fully inflated. At that altitude the atmospheric pressure is 210 mm Hg and the temperature is -40 °C. If the full volume of the balloon is 100,000.0 L, how many kilograms of helium will be needed to inflate the balloon?
5. How many liters of pure oxygen, measured at 740 mm Hg and 24 °C, would be required to burn 1.00 g of benzene, C₆H₆ (l), to carbon dioxide and water? (Hint: find the moles of oxygen needed from the balanced equation, then use gas laws.)
6. Air from the prairies of North Dakota in winter contains essentially only nitrogen, oxygen, and argon. A sample of air collected at Bismarck at -22 °C and 98.90 kPa had 78.0 % N₂, 21.0% O₂, and 1.0% Ar. Find the partial pressures of each of these gases.
7. For a mole of ideal gas, sketch graphs of
 - a. P vs. V at constant T.
 - b. P vs. T at constant V.
 - c. V vs. T at constant P.
8. What would be the partial pressure of N₂ in a container at 50 °C in which there is 0.20 mole N₂ and 0.10 mole CO₂ at a total pressure of 101.3 kPa?
9. What volume of Ne at one atm and 25.0 °C would have to be added to a sign having a volume of 250 mL to create a pressure of one mm Hg at that temperature?
10. Find the volume of a gas at 800.0 mm Hg and 40.0 °C if its volume at 720.0 mm Hg and 15.0 °C is 6.84 L.
11. 12.8 L of a certain gas are prepared at 100.0 kPa and -108 °C. The gas is then forced into an 855 mL cylinder in which it warms to room temperature, 22.0 °C. Find the pressure of this gas in kilopascals.
12. In a laboratory experiment, 85.3 mL of a gas are collected at 24 °C and 733 mm Hg pressure. Find the volume at STP.
13. What is the mass of 18.9 L of NH₃ at 31.0 °C and 97.97 kPa?
14. 0.279 moles of O₂ in a 1.85 L cylinder exert a pressure of 3.68 atm. What is the temperature in the cylinder (in °C)?
15. A quantity of potassium chlorate is selected to yield, through heating, 75.0 mL of O₂ when measured at STP. If the actual temperature is 28 °C and the actual pressure is 0.894 atm, what volume of oxygen will result?