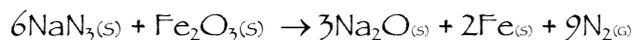


Assorted general gas problems

- 1 On a cool morning (23.0°C) you fill your tires with air to a pressure of 2.5 atm. The temperature of the tire later reaches 66.0°C . What is the new pressure inside the tire? [2.9 atm]
- 2 Find the STP density of neon. [0.89g/L]
- 3 In an explosive like blasting gelatin, a solid reacts to form gases. When confined, the gases build up tremendous pressure and explode. If gases are produced at an initial pressure of 713 atm at 25.0°C , and reach a final pressure of 13,000.0 atm because of a temperature change, find the final temperature in $^{\circ}\text{C}$. [$3.11 \times 10^4\text{K}$]
- 4 Calculate the pressure inside a spent aerosol can if it is accidentally incinerated at 350.0°C . Assume that the gas in the can was originally at 1 atm and room temperature (25.0°C). [2.09 atm]
- 5 How many liters of hydrogen, measuring at 0.940 atmospheres and 32.0°C will be produced from the electrolytic decomposition of 10.0mL of water, take the density of water to be 1.00g/mL? [29.6L]
- 6 Divers working from a North Sea drilling platform experience pressures of 50.0 atm at a depth of 500.0 m. If a balloon is inflated to a volume of 5.0L (the volume of a lung) at that depth at a water temperature of 4.0°C , what would be the volume of the balloon of the surface (1atm) at a temperature of 11.0°C ? [256 L]
- 7 What volume will be occupied by 28.4 grams of propane, C_3H_8 , at STP? [145L]
- 8 For the equation $\text{S}_8 + 8\text{O}_2 \rightarrow 8\text{SO}_2$ What volume of SO_2 is produced at STP if 10. g of S_8 react with excess oxygen? [7.0L]
- 9 A sample of gas exerts a pressure of 625 torr in a 300. mL vessel at 25.0°C . What pressure would the gas sample exert if it were placed in a 500.0 mL container at 50.0°C ? [406 torr]
- 10 Automobiles are equipped with airbags. Many that inflate with N_2 use the rapid reaction of $\text{NaN}_3 + \text{Fe}_2\text{O}_3$ which is initiated by a spark. How many grams of NaN_3 (sodium azide) would be required to provide 75.0L of N_2 at 25.0°C and 748 mmHg? [130. g]



Assorted general gas problems

- 11 Carbon monoxide can be eliminated from stack gases by burning it as it comes out of a smokestack. how many moles of O_2 will be consumed in burning 1500.0L of CO measured at STP? [33.5 mol]

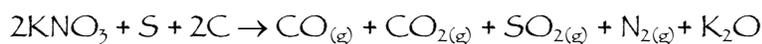


- 12 How much additional pressure would you need to exert on a sample of He at 765 Torr to compress it from 555 mL to 125mL at constant temperature? [33.34×10^3 torr P_T , so an additional 2.63×10^3 torr is needed]

- 13 A 0.473g sample of a gas that occupies 200.0mL at 1.81 atm and 25 °C was analyzed and found to contain 0.414g of N and 0.0591g of H. What is the molecular formula of the compound? [N_2H_4]

- 14 A 2.10 mL bubble of methane gas forms at the bottom of a Louisiana swamp, where the temperature is 8.1 °C and the pressure is 6.4 atm, and rises to the top of the swamp, where the temperature is 25 °C and the pressure is 1 atm. What is the volume of the bubble before it bursts? [14.2 mL]

- 15 Gun powder is a mixture of powdered carbon, potassium nitrate and sulfur. When struck, this substance reacts to form a mixture of gases. Because of their greater volume, the gasses create enough pressure to propel a bullet. If a 0.10 cm^3 sample of gunpowder contains $2. \times 10^{-3}$ moles KNO_3 , and enough S and C to react completely, calculate the volume occupied by of all the gases for the reaction at STP. [0.09L]



- 16 The density of a wood dowel is 0.16g/mL. How tall would the dowel have to be to have the same pressure as 690.0 mmHg? [$13.6g/mL = dHg$] [59.m]

- 17 Calculate the height of a column of glycerol, $d= 1.26g/mL$ in meters that will exert the same pressure as 4.91m of water. [3.90 m]

- 18 An adult takes about 15 breaths per minute, with each breath having a volume of 500 mL. if the air that is inhaled is dry, but exhaled at 1 atm is saturated with water vapor 37°C, what is the mass of water lost from the body in one hour. The vapor pressure of water at 37°C is 47.1 torr. [19.7 g H_2O]

- 19 Calculate the mass of mercury in a uniform column 760 mm high and 1.00 cm^2 in cross sectional area. [1.0×10^3 g]

Assorted general gas problems

- 20 Would deuterium effuse through a porous plate more rapidly or less rapidly than hydrogen? Calculate the relative rates of effusion of the two molecules. (atomic weight of deuterium is 2.0147 amu). What would be the relative rate of effusion of a molecule made of one hydrogen (protium) and one deuterium atom compared to a molecule made only hydrogen (protium)? [1.4131:1; 1.2200]
- 21 The density of helium at 0°C and 1 atm is 0.1786 gL⁻¹. Calculate its density at 100°C and 200 atm. [26.14 g/L]
- 22 Magnesium and aluminum react with acid to give hydrogen gas. What volume of hydrogen gas measured at 25°C and a pressure of 0.985 atm can be obtained from 4.00 g of an alloy that is 20.0 % Mg and 70.0% Al? [0.213L]
- $$\text{Mg}_{(s)} + 2\text{H}^+_{(aq)} \rightarrow \text{H}_{2(g)} + \text{Mg}^{2+}_{(aq)}$$
- $$2\text{Al}_{(s)} + 6\text{H}^+_{(aq)} \rightarrow 3\text{H}_{2(g)} + 2\text{Al}^{3+}$$
- 23 A glass tumbler containing 243 cm³ of air at 0.750 torr and 20°C is turned upside down and immersed in a body of water to a depth of 20.5 m. The air in the glass is compressed by the weight of the water above it. Calculate the volume of air in the glass, assuming the temperature and barometric pressure have not changed. [0.121 mL]
- 24 A sample of breathing mixture for divers contained 34.3% He, 51.7 % N₂ and 14% O₂ by mass. What is the density of this mixture at 22°C and 755 mmHg. [2.6g/L]
- 25 A mixture contained calcium carbonate and magnesium carbonate. A sample of this mixture weighing 7.85g was reacted with excess hydrochloric acid. If the sample reacted completely and produced 2.10 L of carbon dioxide at 25.°C, and 740 mmHg, what are the percentages of calcium carbonate and magnesium carbonate in the sample? [5.11% CaCO₃]