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Ideal gas worksheet

Ideal gas law 1. Use information from STP or SATP conditions that determine the value of the ideal gas constant. 2. What mass does a sample of 1.00 oxygen moles at 50oC and 98.6 kPa occupy? 3. A sample of 4.25 moles of hydrogen at 20.0oC occupying a volume of 25.0 L. Under what pressure is this sample? 4. If a steel cylinder with a volume of 1.50 L contains 10.0 moles of oxygen, under pressure is oxygen if the temperature is 27.0oC? 5. When the pressure in a certain gas cylinder with a volume of 4.50 L reaches 500 atm, the cylinder is capable of exploding. If this cylinder contains 40.0 moles of argon at 25.0oC, is it on the verge of exploding? Calculate atmospheric pressure. 6. At 22.0oC and pressure 100.6 kPa, a gas was found to have a density of 1.14 g/L. Calculate its molecular mass. 7. Gases were found to have a density of 1.76 mg/mL at 24.0oC and a pressure of 98.8 kPa. What is its molecular mass? 8. How many milliliters of nitrogen, N2, will have to be collected at 99.19 kPa and 28oC to have a sample containing 0.015 moles of N2? 9. The density of a certain gas at 27.0oC and 98.66 kPa is 2.53 g/L. Calculates its molecular mass. 10. What mass is occupied by 0.25 grams of O2 measured at 25.0oC and 100.66 kPa? 11. What is the molecular mass of the gas if 2.82 grams of gas account for 3.16 liters at STP? 12. A balloon is filled with 30.0 kg of helium gas. What volume can be filled to a pressure of 1.15 atm if the temperature is 20.0oC? 13. In the gas thermotherm, the pressure required to fix the volume of 0.20 g of helium at 0.50 L is 113.30 kPa. What is temperature? 14. A gas compound with an experimental CHCl formula. At 100oC, its density at 99.97 kPa is $3.12 \times 10^{-3} \text{ g cm}^{-3}$. What is the molecular formula of this compound? 15. Pressure impacted on divers by water increases by about 100 kPa for every 10 m depth. A diver uses air at a speed of 8 L per minute at a depth of 10 m, where the pressure is 200 kPa (100 kPa due to the atmosphere and 100 kPa due to water pressure) and temperature 8oC. If the diver's 10 L gas can be filled to ensure $2.1 \times 10^4 \text{ kPa}$ at a dockside temperature of 32oC, how long can divers stay submerged? 16. You want to send chlorine gas, Cl2, safely from Vancouver to Kingston. Chlorine gas is very toxic and corrosive. You have a 5000 L truck cylinder that will withstand the pressure of 100 atm. The cylinder will be kept at 2oC during the trip. How many moles of chlorine gas can you safely transport? Answer In this spreadsheet, we will practice using the ideal gas law, in relation to the pressure, volume, quantity and temperature of an ideal gas. Q1: What oxygen mass is at 423.0 K and pressure 127.4 kPa is generated by the decomposition of 129.7 g BaO2 to BaO and O2? CH2: How many cubic meters of air is at pressure bar and 0.00.C is required per ton of FeO23 to convert feo23 into iron in an explosive furnace, assumptions that no throughput output is added? For this exercise, let's say the air is 21.0% oxygen by volume. The gas constant is 8.2057 m3/mol.K. $A_2.13 \times 10^3 \text{ m}^3$ B0.213 m3 C474 m3 D142 m3 E213 m3 Ideal Gas Law Spreadsheet 1. Use information from STP or SATP conditions that determine the value of the ideal gas constant. 2. What mass does a sample of 1.00 oxygen moles at 50oC and 98.6 kPa occupy? 3. A sample of 4.25 moles of hydrogen at 20.0oC occupying a volume of 25.0 L. Under what pressure is this sample? 4. If a steel cylinder with a volume of 1.50 L contains 10.0 moles of oxygen, under pressure is oxygen if the temperature is 27.0oC? 5. When the pressure in a certain gas cylinder with a volume of 4.50 L reaches 500 atm, the cylinder is capable of exploding. 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