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The following practice problems are to master to topics on the ideal gas laws: Boyle's law, Charles's law, and Avogadro's Law, as well as the combined gas law equation. There are examples to work on the Dalton law of partial pressures, the Graham's law of effusion, and gas stoichiometry. Here are the links to the topics covered in this practice set: 1. The pressure of a gas is 2.30 atm in a 1.80 L container. Calculate the final pressure of the gas if the volume is decreased to 1.20 liters. 2. After changing the pressure of a gas sample from 760.0 torr to 0.800 atm, it occupies 4.30 L volume. What was the initial volume of the gas? 3. What will be the final volume of a 3.50 L sample of nitrogen at 20.0 °C if it is heated to 200. °C? 4. The volume of a gas decreased from 2.40 L to 830. mL and the final temperature is set at 40.0 °C. Assuming a constant pressure, calculate the initial temperature of the gas in kelvins. 5. A sample of helium gas at 1.40 atm is heated from 23.0 °C to 400.0 K. How many atmospheres is the final pressure of the helium gas? 6. A sample of hydrogen gas is added in a 5.80 L container at 56.0 °C. How many moles of the gas are present in the container if the pressure is 6.70 atm? 7. What is the pressure in a 26.0 L container with 5.40 moles of nitrogen dioxide if the temperature is 64.0°C? 8. A 3.7 L gas sample, initially at STP, is heated to 280. °C at constant volume. Calculate the final pressure of the gas in atm. 9. A 2.65 g sample of dry ice (solid carbon dioxide) is placed in a 2.90-L vessel and converted into CO2 gas. Calculate the pressure inside the vessel if the temperature is at 35.0 °C. 10. A gas sample is stored in a 429 mL container at 9.50°C and 2.20 atm. Calculate the pressure of the gas if the volume changes to 134 mL and the container is heated to 134.5°C? Assume a constant amount of gas. 11. A gas sample occupies 22.0 L at 171°C and 1.43 atm. Calculate the volume of the gas if its temperature and pressure are increased to 197 °C and 1.80 atm respectively. 12. A sample of ethylene gas (C2H6) collected in a 36.4 mL vessel with a freely moving piston, at 31.0 °C exerts 745 mmHg pressure. What is the volume of this gas at STP? 13. A gas-filled balloon having a volume of 3.50 L at 1.30 atm and 25.0 °C is allowed to rise 5 km above the surface of Earth, where the temperature and pressure are 12.0 °C and 1.10 atm, respectively. What would the volume of the balloon be in these conditions? 14. What is the density of CO2 gas at 386 K and 17.0 atm. 15. Determine the density of ammonia gas, NH3, at 36.0 °C and 695 mmHg. Report the density in grams per liter. 16. A scientist carries out an experiment to determine the molar mass of a colorless liquid which exerts 756 mmHg pressure when vaporized in a 260-mL flask at 142 °C. What is the molecular mass of this compound? 17. Identify the unknown gas that weighs 17.75 grams in a 17.0 L cylinder held at 0.700 atm pressure and 250°C. a) NO2 b) CO2 c) H2 d) SO2 e) He 18. What is the ratio of the effusion rates of hydrogen gas (H2) and carbon dioxide (CO2) at the same pressure and temperature? 19. The rate of effusion of an unknown gas is 9.20 mL/min. Under identical conditions, the rate of effusion of pure nitrogen (N2) gas is 14.65 mL/min. Identify the unknown gas using the Graham's law. a) O2 b) C3H8 c) C4H10 d) NO2 e) Cl2 20. A sample of krypton effuses from a container in 95 seconds. The same amount of an unknown gas requires 55 seconds. Identify the unknown gas. 21. If a sample of Br2 vapor can effuse from an opening in a heated vessel in 46 s, how long will it take the same amount of He to effuse under identical conditions? 22. It has been demonstrated that 3.56 mL of an unknown gas effuses through a hole in the same time that 8.64 mL of argon does under the same conditions. Determine the molecular mass of the unknown gas. 23. What is the partial pressure of nitrogen in a mixture of N2, SO2 and CO2 that has a total pressure of 6.84 atm. The partial pressure of SO2 is 2.10 atm, and the partial pressure of CO2 is 1.74 atm. 24. 13.2 grams of CO2 and 6.00 grams of He are mixed in a 4.00 L container at 300. K. Calculate the partial pressure of both gases and the total pressure of the mixture. 25. A 3.00-L bulb containing N2 at 1.80 atm pressure is connected to a 2.00-L bulb filled with H2 at 3.50 atm pressure. What is the final pressure of the system when the valve is opened? 26. Assuming ideal gas behavior, calculate the total pressure (in atm) of a mixture of 0.0260 mol of nitrogen, N2, and 0.0170 mol of argon, Ar, in a 3.50-L flask at 20 °C. 27. A mixture of gases contains CH4, N2, and H2 and exerts a total pressure of 2.65 atm. The mixture contains 0.456 mol of CH4, 0.540 mol of N2 and 0.730 mol of H2. What is the partial pressure of hydrogen in atmospheres? 28. The partial pressures of CH4, C3H8, and C4H10 in a gas mixture are 270 torr, 1016 torr, and 1142 torr, respectively. What is the mole fraction of butane (C4H10)? 29. In a mixture of two gases, the partial pressure of CO2(g) is 0.145 atm and that of O2(g) is 0.370 atm. a) What is the mole fraction of each gas in the mixture? b) Calculate the total number of moles of gas in the mixture if the mixture occupies a volume of 12.5 L at 45.0 °C. c) Calculate the number of grams of each gas in the mixture. 30. Oxygen can be prepared in the laboratory by decomposing potassium chlorate, KClO3 according to the following reaction: 2KClO3(s) → 2KCl(s) + 3O2(g). How many liters of oxygen can be produced from 4.80 g KClO3, if the reaction is carried out at standard conditions? 31. Sodium azide is used in automobile airbags as a source of nitrogen gas to rapidly inflate the bags upon a hit. If the volume of the airbag is 7.95 L, what mass of NaN3 is required to produce enough nitrogen to fill it at 23.0 °C and 1.20 atm? 2NaN3(s) → 2Na(s) + 3N2(g) 32. Calcium hydride (CaH2) can be used as a drying agent and a source of Hydrogen, because of its high reactivity with water. CaH2(s) + 2 H2O(l) → Ca(OH)2(aq) + 2H2(g) How many grams of CaH2 are needed to produce 76.8 L of H2 gas at a pressure of 0.750 atm and a temperature of 25 °C? 33. Propane (C3H8) is used as a fuel in gas barbecue grills. How many liters of oxygen, taken at STP, are needed for the full combustion of 26.4 g of propane? C3H8(g) + 5O2(g) → 3CO2(g) + 4H2O(l) 34. Lithium hydroxide (LiOH) is used in space shuttles to absorb the carbon dioxide exhaled by astronauts according to the following equation: 2LiOH(s) + CO2(g) → Li2CO3(s) + H2O(l) How many liters of carbon dioxide gas at 23.0 °C and 732 mmHg could be absorbed by 284 g of lithium hydroxide? 35. In a particular reaction, at 25 °C, 19.4 L of carbon monoxide at a 950.0 torr is mixed with 11.2 g of iron (III) oxide, and 5.68 g iron is obtained. What is the percent yield of the reaction? Fe2O3 + 3CO(g) → 2Fe + 3CO2(g) Examples and Problems only Ten Examples KMT & Gas Laws Menu The form of the Combined Gas Law most often used is this: (P1V1) / T1 = (P2V2) / T2 Most commonly V2 is being solved for. The rearrangement looks like this: V2 = (P1V1T2) / (T1P2) A reminder: all these problems use Kelvin for the temperature. I will not usually comment on the change from °C to K. I will use 273 but be aware that your teacher (or computer lesson) may insist on using 273.15. When you use the combined gas law paired with Dalton's Law, remember that a gas collected over water is always considered to be saturated with water vapor. The vapor pressure of water varies with temperature and must be looked up in a reference source. Problem #1: A gas has a volume of 800.0 mL at -23.0 °C and 300.0 torr. What would the volume of the gas be at 227.0 °C and 600.0 torr of pressure? Solution: 1) Set up all the problem values in a solution matrix: P1 = 300.0 torr P2 = 600.0 torr V1 = 800.0 mL V2 = x T1 = 250. K T2 = 500. K 2) The combined gas law is rearranged to isolate V2: 3) Values are inserted into the proper places: (300.0 torr)(800.0 mL)(500.0 K) V2 = ----- (250.0 K)(600.0 torr) V2 = 800.0 mL Problem #2: 500.0 liters of a gas in a flexible-walled container are prepared at 700.0 mmHg and 200.0 °C. The gas is placed into a tank under high pressure. When the tank cools to 20.0 °C, the pressure of the gas is 30.0 atm. What is the volume of the gas? Solution: 1) The combined gas law is rearranged to isolate V2: V2 = (P1V1T2) / (T1P2) 2) Values are inserted into the proper places: V2 = [(0.92105)(500)(293)] / [(473)(30)] V2 = 9.51 L Note the use of square brackets to communicate the correct order of operations. Note that the problem provides different pressure units for the starting and ending values. I used 700/760 to convert from mmHg to atm. Note that I paid scant attention to setting up the problem with correct sig figs in the problem. This happens often in gas law problems. Note also I omitted all the units. Problem #3: 690.0 mL of oxygen are collected over water at 26.0 °C and a total pressure of 725.0 mm of mercury. What is the volume of dry oxygen at 52.0 °C and 800.0 mm pressure? Solution: 1) Use Dalton's Law to remove the pressure of the water vapor: Ptotal = P O2 + PH2O P O2 = Ptotal - PH2O P O2 = 725.0 mmHg - 25.2 mmHg = 699.8 mmHg The 25.2 value came from here. I looked up the value associated with 26.0 °C and converted it from kPa to mmHg following the instructions given. 2) Here are the values in a solution matrix: P1 = 699.8 mmHg P2 = 800.0 mmHg V1 = 690.0 mL V2 = x T1 = 299.0 K T2 = 325.0 K A common student error is to use Dalton's Law, but then use the total pressure value in the combined gas law instead of using the correct value. The correct pressure to use for P1 is the 699.8 value, not the 725 value. The 725 is the pressure of an oxygen/water mixture and we want ONLY the oxygen (which is the 699.8 value). 3) Use the combined gas law: x = [(699.8)(690.0)(325)] / [(299)(800.0)] x = 656 mL (to three sig figs) Problem #4: What is the volume of gas at 2.00 atm and 200.0 K if its original volume was 300.0 L at 0.250 atm and 400.0 K. Solution: 1) Here are the values in a solution matrix: P1 = 0.250 atm P2 = 2.00 atm V1 = 300.0 L V2 = x T1 = 400.0 K T2 = 200.0 K Note how the problem statement is worded so as to give the starting values last. 2) The combined gas law rearranged to isolate V2: V2 = (P1V1T2) / (T1P2) x = [(0.25)(300)(400)] / [(400)(2)] x = 18.75 L To three sig figs, this is 18.8 L Problem #5: At conditions of 785.0 torr of pressure and 15.0 °C temperature, a gas occupies a volume of 45.5 mL. What will be the volume of the same gas at 745.0 torr and 30.0 °C? Solution: V2 = [(785 mmHg)(45.5 mL)(303 K)] / (288 K)(745 mmHg) V2 = 50.3757 mL To three sig figs, the answer is 50.4 mL Problem #6: What is the final volume of a 400.0 mL gas sample that is subjected to a temperature change from 22.0 °C to 30.0 °C and a pressure change from standard pressure to 360.0 mmHg? Solution: We are looking to determine V2 in this problem. Here's the set up: P1 = 760.0 mmHg P2 = 360.0 mmHg V1 = 400.0 L V2 = x T1 = 295 K T2 = 303 K V2 = [(760 mmHg)(400 mL)(303 K)] / [(295 K)(360 mmHg)] V2 = 867 mL (to three sig figs) Problem #7: 400.0 mL of hydrogen are collected over water at 18.0 °C and a total pressure of 740.0 mm of mercury. (a) What is the partial pressure of H2? (b) What is the partial pressure of H2O? (c) What is the volume of DRY hydrogen at STP? Solution: 1) We will use Dalton's Law to determine the partial pressure of the dry hydrogen gas. We look up the vapor pressure of water in a reference source. Ptotal = PH2 + PH2O PH2 = Ptotal - PH2O PH2 = 740.0 - 15.5 = 724.5 mmHg I used a different reference source than previously used for the vapor pressure of water. There are many available on the Internet. 2) The partial pressure of the water is its vapor pressure of 15.5 mmHg. 3) Combined gas law rearranged to show V2 isolated: (724.5 mmHg)(400.0 mL)(273 K) V2 = ----- (291 K)(760.0 mmHg) V2 = 358 mL (to three sig figs) Problem #8: The pressure of a gas is reduced to 75% of its initial value and the volume is increased by 40% of its initial value. Find the final temperature, given that the initial temperature was -10 °C. Solution: Let us assign P1 = 1, therefore P2 = 0.75 Let us assign V1 = 1, therefore V2 = 1.4 I won't bother with units on P or V. Your teacher may want the units added in, so I'll do that below. T1 = -10 °C = 263 K P1V1/T1 = P2V2/T2 [(1 atm)(1 L)] / 263 K = [(0.75 atm)(1.4 L)] / x (1 atm) (1 L) (x) = (263 K)(0.75 atm)(1.4 L) x = 276.15 K = 3.15 °C Problem #9: The pressure of 8.06 L of an ideal gas in a flexible container is decreased to one-third of its original pressure, and its absolute temperature is decreased by one-half. What is the final volume of the gas? Solution: 1) Assign values as follows: P1 = 3.00 atm P2 = 1.00 atm V1 = 8.06 LV2 = x T1 = 2.00 K T2 = 1.00 K Note the made up values for P and T. 2) Insert values into the combined gas law equation and solve for x: P1V1 / T1 = P2V2 / T2 [(3.00 atm)(8.06 L)] / 2.00 K = [(1.00 atm)(x)] / 1.00 K x = 12.1 L (to three sig figs) Problem #10: A balloon of air now occupies 10.0 L at 25.0 °C and 1.00 atm. What temperature was it initially, if it occupied 9.40 L and was in a freezer with a pressure of 0.939 atm? Solution: 1) Assign values as follows: P1 = 0.939 atm P2 = 1.00 atm V1 = 9.40 LV2 = 10.0 L T1 = x T2 = 298 K Note how the problem gives you the ending conditions regarding PVT and asks you for a starting condition. Also, note that temperature is asked for. Compare this to the usual case of asking for the final volume. 2) Let's rearrange the combined gas law equation for T1: P1V1 / P2V2 = T1 / T2 T1P2V2 = P1V1T2 3) Put values in and solve: (0.939 atm)(9.40 L)(298 K) T1 = ----- (1.00 atm)(10.0 L) T1 = 263 K The form of the final temperature was not specified, but it is usually asked for in Celsius, so: T1 = -10. °C Problem #11: A gas occupies an 8.00 mL flexible-walled container. The pressure is doubled, the absolute temperature is quadrupled, and 15% of the gas leaks out. What is the new volume? Solution: 1) This problem involves the combined gas law that has all four variables in it: P1V1 / P2V2 = T1 / T2 n1T1 = n2T2 2) The changes are all expressed in a relative way, so I will assume 1.00 atm and 1.00 K. P1 = 1.00 atm P2 = 2.00 atm V1 = 8.00 mL V2 = x n1 = 1.00 mol n2 = 0.85 mol T1 = 1.00 K T2 = 4.00 K By the way, having a gas at 1.00 K is pretty much an impossible thing. Pure helium-3 liquefies at about 3.2 K. No gas exists as a gas at 1 K. The point, of course, is to make the absolute temperature quadruple. We could use 100 K and 400 K and get the same answer. Or use 200 K and 800 K. The key point is that the temperature quadruples. And, note that it is the absolute temperature (in K) that quadruples, not the temperature in degrees Celsius. Notice how I interpreted the 15% to mean 15% of the moles of gas escaped. If I decided that 15% of the mass escaped, the problem answer would be the same. I will leave it to you to figure out, if you so desire. 3) I won't bother to isolate V2 this time: (1.00 atm)(8.00 mL) (2.00 atm)(x) = ----- (1.00 mol)(1.00 K) x = ----- (2.00 atm)(1.00 mol)(1.00 K) x = 13.6 mL Problem #12: What is the density, in g/L, for a gaseous compound at STP if the gas in a 1.00 L bulb weighs 0.672 g at 25.0 °C and 733.4 mm Hg? Solution: 1) We need to know the volume of the gas at STP. For this, we use the combined gas law. Here's the data: P1 = 733.4 mmHg P2 = 760.0 mmHg V1 = 1.00 L V2 = x T1 = 298 K T2 = 273 K 2) Here's the combined gas law with the data filled in: (733.4 mmHg)(1.00 L) (760.0 mmHg)(x) = ----- 298 K 273 K After a bit of math, we find: x = 0.884 L. 3) We are now ready to determine the density: 0.672 g / 0.884 L = 0.760 g/L Problem #13: Predict how the volume of a given mass of gas will differ when the following changes in the temperature and pressure are made: (a) The pressure is tripled while the absolute temperature is doubled. (b) The absolute temperature is doubled while the pressure is reduced by half. (c) The pressure and the absolute temperature are both doubled. (d) The temperature is increased by four times while at the same time the pressure is doubled. Solution to (a): 1) Place "fake" values into a solution matrix: P1 = 1 kPa P2 = 3 kPa V1 = 1 LV2 = ??? T1 = 1 K T2 = 2 K Note how the pressure tripled (from 1 to 3) and the temperature doubled (from 1 to 2). 2) Use the combined gas law to solve: V2 = (P1V1T2) / (P2T1) Notice I isolated V2 V2 = [(1)(1)(2)] / [(3)(1)] V2 = 0.67 L In other words, V2 is two-thirds of V1. Solution to (b): 1) I'll use the form of the combined gas law that isolates V2: V2 = (P1V1T2) / (P2T1) 2) The absolute temperature is doubled: V2 = (P1V1 (2) / (P2 (1) 3) The pressure is reduced by half: V2 = (2 V1 (2) / (1) (1) Notice how I went from 2 to 1. I felt that was clearer than going from 1 to 0.5. 4) The result: V2 = 4V1 The volume is increased by a factor of 4. Solution to (c): V2 = (P1V1T2) / (P2T1) V2 = (1 V2 (2) / (2) (1) Note placement of values for temperature, with T1 in the denominator and T2 in the numerator. With the symbolic equation being all on one line, you might be tempted to think the temperature was cut in half. Not so! V2 = V1 Solution to (d): 1) Place "fake" values into a solution matrix: P1 = 1 kPa P2 = 2 kPa V1 = 1 LV2 = ??? T1 = 1 K T2 = 4 K 2) Use the combined gas law to solve: V2 = (P1V1T2) / (P2T1) V2 = (1) V1 (4) / (2) (1) V2 = 2V1 In other words, the volume doubles. Problem #14: What is molar volume at SATP? Solution: 1) SATP stands for Standard Ambient Temperature and Pressure. It has the following values: 25.0 °C and 100.0 kPa You may find more discussion here. 2) Let us use the Combined Gas Law to solve this problem. First, a solution matrix: P1 = 101.325 kPa P2 = 100.0 kPa V1 = 22.414 LV2 = ??? T1 = 273 K T2 = 298 K Note the use of values for STP and molar volume at STP. 2) Write the Combined Gas Law, insert values and solve: P1V1 / P2V2 = T1 / T2 (101.325 kPa)(22.414 L) (100.0 kPa)(V2) = ----- 273 K 298 K V2 = [(101.325 kPa)(22.414 L)(298 K)] / [(100.0 kPa)(273 K)] V2 = 24.8 L (to three sig figs) 2) Molar volume at SATP can also be calculated using the Ideal Gas Law: PV = nRT (100.0 kPa / 101.325 kPa/atm) (V) = (1.00 mol) (0.08206 L atm / mol K) (298 K) V = 24.8 L Problem #15: A sample of neon has a volume of 0.730 dm3 at a temperature of 21.0 °C, and pressure of 102.5 kPa. If the density of neon is 0.900 g/dm3 at 0 °C and 101.3 kPa, what is the mass of the sample? Solution: 1) Convert gas conditions to STP. Here's the cross-multiplied form of the combined gas law: P1V1T2 = P2V2T1 (102.5 kPa)(0.730 dm3) (273 K) = (101.3 kPa)(V2) (294 K) V2 = 0.685887 dm3 2) Determine mass: 0.685887 dm3 times 0.900 g/dm3 = 0.617 g Problem #16: Suppose the pressure on a 10.0 m3 sample gas at 12.0 °C is cut in half. (a) Is it possible to change the temperature of the gas at the same time such that the volume of the gas doesn't change? (b) If yes, calculate the new temperature of the gas Solution to (a): We can't answer this without doing the calculation for (b). This is because the temperature must go down to keep the volume at 10.0 m3. If the temperature most go down to absolute zero (or below), then the answer would to (a) would be no. Otherwise, we would answer yes. I know the temp must go down because of this: the pressure went down, therefore the volume went up (assuming constant temperature). In order to get the volume back to 10, we must cool the gas down (assuming constant pressure). Solution to (b): 1) Use the combined gas law: P1V1 / P2V2 = T1 / T2 (2 atm) (10.0 m3) (1 atm) (10.0 m3) = ----- 285 K x I used arbitrary values for the pressure. The actual values don't matter, just as long as the pressure gets cut in half. 2) See how the volume does not change? That means it drops out and we have a pressure-temperature relationship: 2 atm 1 atm = ----- 285 K x x = 142.5 K 3) Change to Celsius to get -130 °C. So, the answer to (a) is yes. Examples and Problems only Ten Examples KMT & Gas Laws Menu PROBLEM ((PageIndex(1))) Sometimes leaving a bicycle in the sun on a hot day will cause a blowout. Why? Answer As temperature of a gas increases, pressure will also increase based on the ideal gas law. The volume of the tire can only expand so much before the rubber gives and releases the build up of pressure. PROBLEM ((PageIndex(2))) Explain how the volume of the bubbles exhausted by a scuba diver change as they rise to the surface, assuming that they remain intact. Answer As the bubbles rise, the pressure decreases, so their volume increases as suggested by Boyle's law. PROBLEM ((PageIndex(3))) One way to state Boyle's law is "All other things being equal, the pressure of a gas is inversely proportional to its volume." (a) What is the meaning of the term "inversely proportional?" (b) What are the "other things" that must be equal? Answer A The pressure of the gas increases as the volume decreases Answer b amount of gas, temperature PROBLEM ((PageIndex(4))) An alternate way to state Avogadro's law is "All other things being equal, the number of molecules in a gas is directly proportional to the volume of the gas." What is the meaning of the term "directly proportional?" What are the "other things" that must be equal? Answer A The number of particles in the gas increases as the volume increases Answer b temperature, pressure PROBLEM ((PageIndex(5))) A spray can is used until it is empty except for the propellant gas, which has a pressure of 1344 torr at 23 °C. If the can is thrown into a fire (T = 475 °C), what will be the pressure in the hot can? Answer 3.40 × 103 torr Click here to see a video solution PROBLEM ((PageIndex(6))) What is the temperature of an 11.2-L sample of carbon monoxide, CO, at 744 torr if it occupies 13.3 L at 55 °C and 744 torr? Answer 276°K 3°C PROBLEM ((PageIndex(7))) A 2.50-L volume of hydrogen measured at -196 °C is warmed to 100 °C. Calculate the volume of the gas at the higher temperature, assuming no change in pressure. Answer 12.1 L Click here to see a video solution PROBLEM ((PageIndex(8))) A balloon inflated with three breaths of air has a volume of 1.7 L. At the same temperature and pressure, what is the volume of the balloon if five more same-sized breaths are added to the balloon? Answer 4.5 L PROBLEM ((PageIndex(9))) A weather balloon contains 8.80 moles of helium at a pressure of 0.992 atm and a temperature of 25 °C at ground level. What is the volume of the balloon under these conditions? Answer 217 L Click here to see a video solution PROBLEM ((PageIndex(10))) How many grams of gas are present in each of the following cases? 0.100 L of CO2 at 307 torr and 26 °C 8.75 L of C2H4, at 378.2 kPa and 483 K 221 mL of Ar at 0.23 torr and -54 °C Answer a 7.24 × 10-2 g Answer b 23.1 g Answer c 1.5 × 10-4 g PROBLEM ((PageIndex(11))) A high altitude balloon is filled with 1.41 × 104 L of hydrogen at a temperature of 21 °C and a pressure of 745 torr. What is the volume of the balloon at a height of 20 km, where the temperature is -48 °C and the pressure is 63.1 torr? Answer 1.2741 × 105 L or more correctly to 3 significant figures 1.27 × 105 L Click here to see a video solution PROBLEM ((PageIndex(12))) While resting, the average 70-kg human male consumes 14 L of pure O2 per hour at 25 °C and 100 kPa. How many moles of O2 are consumed by a 70 kg man while resting for 1.0 h? Answer 0.565 mol PROBLEM ((PageIndex(13))) A balloon that is 100.21 L at 21 °C and 0.981 atm is released and just barely clears the top of Mount Crumpet in British Columbia. If the final volume of the balloon is 144.53 L at a temperature of 5.24 °C, what is the pressure experienced by the balloon as it clears Mount Crumpet? Answer 0.644 atm Click here to see a video solution PROBLEM ((PageIndex(14))) If the temperature of a fixed amount of a gas is doubled at constant volume, what happens to the pressure? Answer Temperature and Pressure are directly proportional. Pressure will also have to increase (doubling). PROBLEM ((PageIndex(15))) If the volume of a fixed amount of a gas is tripled at constant temperature, what happens to the pressure? Answer Volume and pressure are inversely proportional. The pressure decreases by a factor of 3. Contributors Dark mode This online quiz is intended to give you extra practice in performing a variety of gas laws calculations involving pressure, volume and temperature, as well as Ideal Gas Law problems. Select your preferences below and click 'Start' to give it a try! 100%(1)100% found this document useful (1 vote)2K viewsThis document provides 9 mixed gas law practice problems involving ideal gas law, Dalton's law of partial pressures, and Graham's law. The problems cover a range of concepts including determ... Save Save Extra Practice Mixed Gas Law Problems Answers For Later100%100% found this document useful, undefined