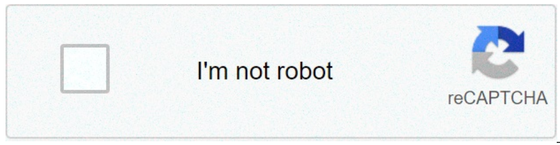

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Gas laws simulation lab worksheet answers

Monday 3 February Last week, students were introduced to four different gas laws: Law of Avogadro, Law of Boyle, Law of Charles and Law of Gay-Lussac. We conducted a laboratory using the marbles to determine the effect of volume, temperature and number "molecules" on the pressure. We also practiced solving problems using Boyle's law and learned more about pressure and volume variables. For our work today, students will complete the guided notes that focus on the laws of Boyle, Charles and Gay-Lussac. We will also focus on the temperature variable, differentiating between Fahrenheit, Celsius and Kelvin. Students also received an Exit Task designed to illustrate the process and expectations to solve a gas laws type problem. Class notes: This presentation requires JavaScript. Keep learning! Want to know more about Absolute Zero and Kelvin Scale? Discover the selection of videos below and expand your mind: Tuesday, February 4: We will complete our thorough look at math and think about the laws of Boyle, Charles and Gay-Lussac by completing the notes issued yesterday. Students will then start working through the simulation of gas laws and the accompanying guided work package (ACT resource – provided by Mr. Swart). Students interested in pursuing the Onore Option this semester also received an optional Gases Poster assignment which will be February 28 and will be presented to the class that day. Students can work alone or with a partner. Class Note: Wednesday 5 February: All students of 10th degree are out of the building on a career-day field trip. Students of not 10th degree will have the class period to work on the simulation of gas laws. Thursday 6 February: students will have the whole class period as working day forthe simulation of gas laws. Students will also receive their Exit Task from Monday to use as a study tool for the quiz tomorrow. The answer key is provided below: Note: The quiz quizwill include questions about the laws of the gas learned so far, and will also include math problems that require the sort of algebra revised in the Monday entry task. Students can use guided notes from Monday/Tuesday on the quiz. In this simulation, students investigate three of the fundamental laws of gas, including Boyle's law, Charles' law and Gay-Lussac law. Students will have the opportunity to visually examine the effect of changing associated variables of pressure, volume or temperature in each situation. In addition, students will analyze gas samples at particle level and manipulate quantitative data in each scenario. Finally, students will interpret data trends by examining the graph associated with each of the laws on gas. This simulation has been developed through a generous funding provided by the Dow Chemical Company, the Founding Son of AACT. Page 2 1 – 25 of 66 class resource measures, Volume | Elementary School In this activity, students will use the basic blocks of ten centimeters to fill the containers to understand the concept of volume. Through discussion and review of data, the teacher will lead them to discover the formula to determine the volume. Chemical change, Volume | Primary school, Middle school In this laboratory, students will learn how chemistry is used in air bags. Students will model the inflation of an air bag by performing a series of reactions using the soda and vinegar in a Ziploc bag. During this survey, students will see that there is a relationship between the size of the inflation of the bag and the amount of reactive used. Finally, students will be challenged to design an air bag that can help an egg endure a crash test. Gas Laws, Pressure, Measures, Molar Mass, Ideal Gas, Partial Pressure, Error Analysis | High School Inlaboratory, students will experimentally determine the molar mass of butane using the Dalton law and the ideal gas law. They will also beerror per cent and explain possible sources of error. Percentage Composition, Ideal Gas | High School In this laboratory, students collect data to determine pressure within a popcorn kernel when opening using the ideal gas law. They also calculate the percentage of water in the medium popcorn kernel. This resource includes two versions of the student, traditional and required activity. Gas Laws, Stoichiometria, Mole Concept | High School In this laboratory, students will study the chemical reaction used in the self-flating ball. They will apply their knowledge of the laws of gas and stoichiometry in order to determine the quantities of reactives used to inflate the ball. Gas Laws, Pressure, Measures, Molar Mass, Ideal Gas, Partial Pressure, Error Analysis | High School In this laboratory, students will experimentally determine the molar mass of a gas, specifically butane (C4H10), from water collection. This experiment is an investigation-based experiment for 2nd year chemistry or AP chemistry students who previously collected an insoluble gas. Gas Laws, Stoichiometria, Kinetic Molecular Theory, Ideal Gas, Partial Pressure | High School In this laboratory, students collect a sample of gas on the water and will use more scientific principles, including stoichymetry and gas laws to experimentally determine the Ideal Gas Constant Law (R). Solubility, Temperature, Pressure, Concentration, Solute & Solvent | High School In this demonstration, students will explore how pressure and temperature changes affect the solubility of a gas in an aqueous solution. In addition, students will have the opportunity in a post-demonstration reflection activity to practice using data (in this case their demonstration observations) to make evidence-based statements. Density, safetylaboratory, combustion | High School In this demonstration, students will observe the teacher perform two combustion reactions. First the teacher will burn a small sample of propane gas in a beaker. Nextwill burn a small sample of methane gas. Students will create particle diagrams to support their explanation and shape their observations while improving their understanding of gas density. Kinetic Molecular Theory | High School In this demonstration students will experience the spread, and then model the process of spreading the microwave popcorn “taste particles” in a room filled with air again. Gas Laws, Pressure, Volume | High School In this laboratory, students will study the reports of gas variables. Draw particle diagrams and draw equations to express these relationships. They will then join these relationships to derive the law of combined gas and the law of ideal gas. Finally, they will use the molar volume of a gas to STP to obtain the ideal constant of gas, R. Gas Laws, Pressure, Cinethics Molecular Theory, Volume | High School In this demonstration, students will observe two situations. First a student will be lifted from the desk as other students blow air in straws connected to a garbage bag to inflate it. Second, the class will observe a garbage bag that wraps a student as a vacuum removes the air from the bag. Gas Laws, Pressure, History, Volume | Middle School, Middle School In this activity, students will watch a video and answer questions about Robert Boyle. They will learn about its impact in chemistry, including Boyle's law describing the relationship between pressure and volume of a gas. Temperature, Kinetic Molecular Theory, Heat, Temperature | Middle School, High School In this laboratory, students will investigate kinetic molecular theory and particle movement while experiencing a marshmallow. Students will observe how an increase in kinetic energy will cause particles to increase in motion. This concept will be extended in a discussion on furtherof thermal expansion of the real world. Temperature, heat, temperature | Primary school, Middle school In this demonstration, demonstration,investigate what happens in the air when it is heated. Density, temperature, density, molecular movement | Elementary school Students will learn and discuss the behavior of a gas using convection examples and an optional demonstration led by teachers. Students will then participate in a laboratory where they will study water streams by observing the results of mixing hot water colored with ambient temperature water. The laboratory will be followed by a discussion on the molecular activity of the water mixture. Temperature, Pressure | Elementary School, Middle School In this demonstration, students will learn how temperature change affects air pressure, observing an egg that is sucked in a bottle without being touched! Temperature, heat, temperature | Primary school In this demonstration students will learn the cause and effects of global warming. Students look for global warming while also comparing it to a demonstration. This will help students to better understand the effects that temperature change can have on the planet. Temperature, Gas Laws, Volume | Elementary School, Middle School In this demonstration, students will observe and analyze how the temperature change of a gas can affect the volume of a gas. Gas Laws, Stoichiometry | High School In this laboratory students use gas laws and stoichiometry, along with some balloons and simple measuring instruments, to identify a metal carbonate from a short list of possibilities. Temperature, heat, esothermic and endothermic, energy conservation right | High School In this activity, students observe the snap sticks to industrial resistance and cold chemical packages and discuss the processes of endothermic and exothermic reactions. Gas Laws, Pressure, History, Volume | Elementary School, Middle School,average average This video tells the story of Robert Boyle, a great chemist and discoverer of Boyle's Law, who describes the relationship between pressure and volume of a gas. Temperature, Gas Laws, Pressure, Pressure,molecular theory, volume | middle school, high school in this animation, students will display how volume, temperature and quality of a gas are related. This is done qualitatively and quantitatively. *This video does not have audio* gas laws, history, harass concept, measures, ideal gas | high school this video tells the story of avogadro amedeo, the scientist has given credit to the concept of mole, but who has discovered other things in chemistry too. density, chemical change, density, combustion, chemical change, kinetic molecular theory | high school in this demo, students will be witnesses of the combustion of a substance in its gas and liquid states. they will carry out the events themselves, and compare the results of the two reactions. Name: # Gas law in this investigation you will examine three laws of the gas, including boyle law, carlo law and Gay-Lussac law. You will explore how to manipulate volume variables (l,) pressure (atm) and temperature (k) can affect a gas sample. the formula for each of the laws on gas is: Boyle’s law: p1v1 = p2v2 Gay-Lussac’s law: p1 = p2 t1 t2 Charles’ law: v1 = v2 t1 t2 prelab question 1. briefly describe in your words the meaning of each of the following variables, and the common units of measurement associated with each: a. volume b. pressure c. temperature procedure visit make sure to select the tab “Lad’s Law” to start; will be shown in white. You should see the image below on the screen. the law of boyle 1. which of the three variables: Can't pressure, volume or temperature change in boyle law? this variable is considered a constant. 2. using volume control arrows, reduce the volume of gas to 1.70L a. in the space below you record your observations regarding the behavior of particles in the gas sample asvolume is reduced. make sure you discuss collisions in your comments. b. calculate thepressure value for gas, showing all your work. c. check the final answer for part b by clicking the calculation button next to p2. a. observations when the volume is reduced: b. calculation p1v1 = p2v2 3. press the reset button at the top right of the screen. using pressure control arrows, reduce gas pressure to 0.700atm a. in the space below you record your observations regarding the behavior of particles in the gas sample as the pressure is reduced. b. in the space below calculate the new volume value for the gas. c. check the final answer for part b by clicking the calculation button next to v2. a. observations when the pressure is reduced: b. calculation p1v1 = p2v2 important conditions direct or directly proportional relationship: a relationship between two variables, where a variation of a variable results in the same variation of the other variable. For example, if a variable is increased, the other variable will also increase. indirect or inversely proportional relationship: a relationship between two variables, where a variation of a variable results in the opposite variation of the other variable. For example, if a variable is increased, the other variable will decrease. 4. considering the terms described above, do pressure and volume variables have a direct or indirect relationship in the law of boyle? correct your answer with the data. the carlo law changes the simulation of “Charles’ Law” by clicking the tab at the top of the screen will be displayed in white. You should see the image below on the screen. 1. which of the three variables: pressure, volume or temperature cannot be changed in the carlo law? this variable is considered a constant. 2. using volume control arrows, reduce the volume of gas to 1.80L a. in the space below register your observationsto the behaviour of particles in the gas sample as the volume is reduced. b. In the space below calculate the new temperature value for the gas. C. C.the final answer by part b by clicking the calculation button next to T2. a. Comments when volume is reduced: b. Calculation V1 = V2 T1 T2 3. Using temperature controls, increase the gas temperature. What changes do you see in the behaviour of gas particles while the temperature has increased? b. Continue to increase the temperature value up to T2 = 443K. Using the equation for the law of Charles, calculate the volume of the gas at this increased temperature. Check your final response by part b by clicking the calculation button next to V2: V1 = V2 T1 T2 c. Based on the final value calculated in part b) is Charles' law considered a direct or indirect relationship between variables? Explain your choice with reasoning. Gay-Lussac law Change the simulation of “Gay-Lussac’s Law” by clicking the tab at the top of the screen will be shown in white. You should see the image below on the screen. P1 = P2 T1 T2 2. a. Is the Gay-Lussac law equation more like Boyle's law equation or Charles' law equation? b. What variable is kept constant in the law of Gay Lussac? c. Based on your response to part a) what forecast can you do about the relationship between pressure and temperature variables of a gas? 3. a. Using pressure control arrows, increase pressure value to 1.50atm, and fill the corresponding T2 value in the data table below. b. Press the Add Data button. Using pressure control arrows, increase pressure to 2.00atm and fill the corresponding T3 value in the data table below. c. Repeat phase b for pressure values of 2.50atm and 2.90atm. P1 = 1.00atm P2 = 1.50atm P3 = 2.00atm P4 = 2.50atm P5 = 2.90atm T1 = T3 = T4 = T5 = d. Based on the data collected in the table above, what trend can be observed fortemperature of a gas when gas pressure increased? is this considered a direct or indirect relationship between variables? 4. printing pressReset button at the top right of the screen. Using temperature control arrows, reduce gas temperature to 158K. a. In the space below you record your observations about the behaviour of particles in the gas sample, as the temperature is reduced. Make sure you discuss collisions in your comments. b. In the space below calculate the new pressure value for the gas. C. Check the final answer for the b part by clicking the calculation button next to P2. a. Comments when the temperature is reduced: b. Calculation P1 = P2 T1 T2 American Association of Chemistry Teachers 7