Kinetics of chemical reactions lab report

I'm not robot!

From left to right
COLD, NORMAL, HOT

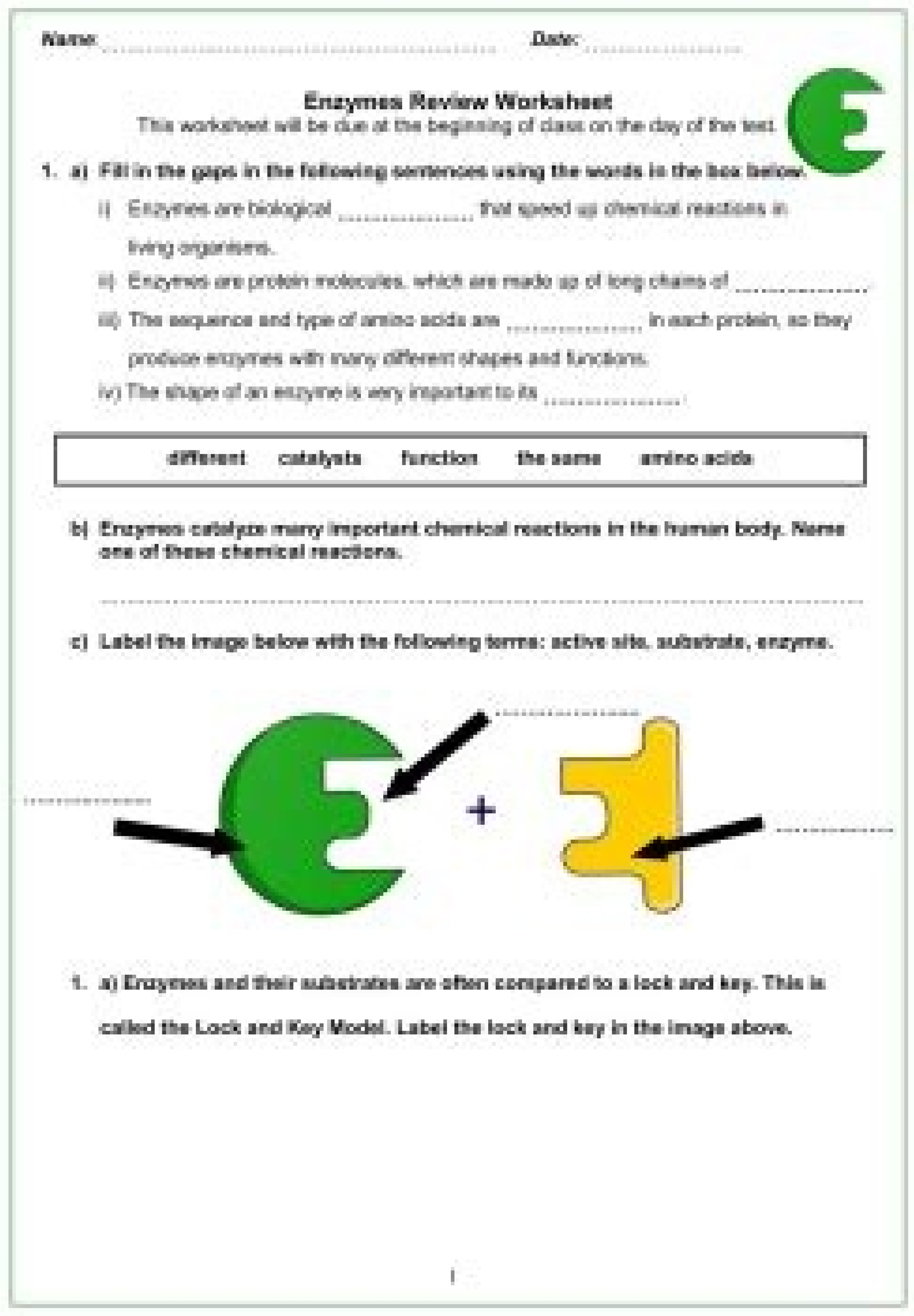
approximately 30 seconds. If you observe a gas forming, test for its identity by holding a lighted matchstick into the solution. Record your observations. Discard the contents of the test tube into the waste container provided.

Table 1. Observations

Reaction	Observation	Reaction Type
1. Iron and copper(II) sulfate		
2. Lead(II) nitrate and potassium iodide		
3. Heated copper(II) sulfate pentahydrate		
4. Magnesium and hydrochloric acid		
5. Heated hydrogen peroxide		

Data Analysis

1. Decide which type of reaction is represented by each reaction observed in the experiment. Record your answers in Table 1.
2. Write a balanced chemical reaction for each of the reaction observed.
3. No combination reactions were described in the procedure section for this experiment. Give an example of a combination reaction from an experiment you have done in Pisay. Please note the title of the experiment and the year it was done. Write the balanced chemical reaction for the reaction.


Name: .... Date: ....

Enzymes Review Worksheet

This worksheet will be due at the beginning of class on the day of the test.

1. a) **Fill in the gaps in the following sentences using the words in the box below.**

i) Enzymes are biological .... that speed up chemical reactions in living organisms.

ii) Enzymes are protein molecules, which are made up of long chains of ....

iii) The sequence and type of amino acids are .... in each protein, so they produce enzymes with many different shapes and functions.

iv) The shape of an enzyme is very important to its ....

different	catalysts	function	the same	amino acids

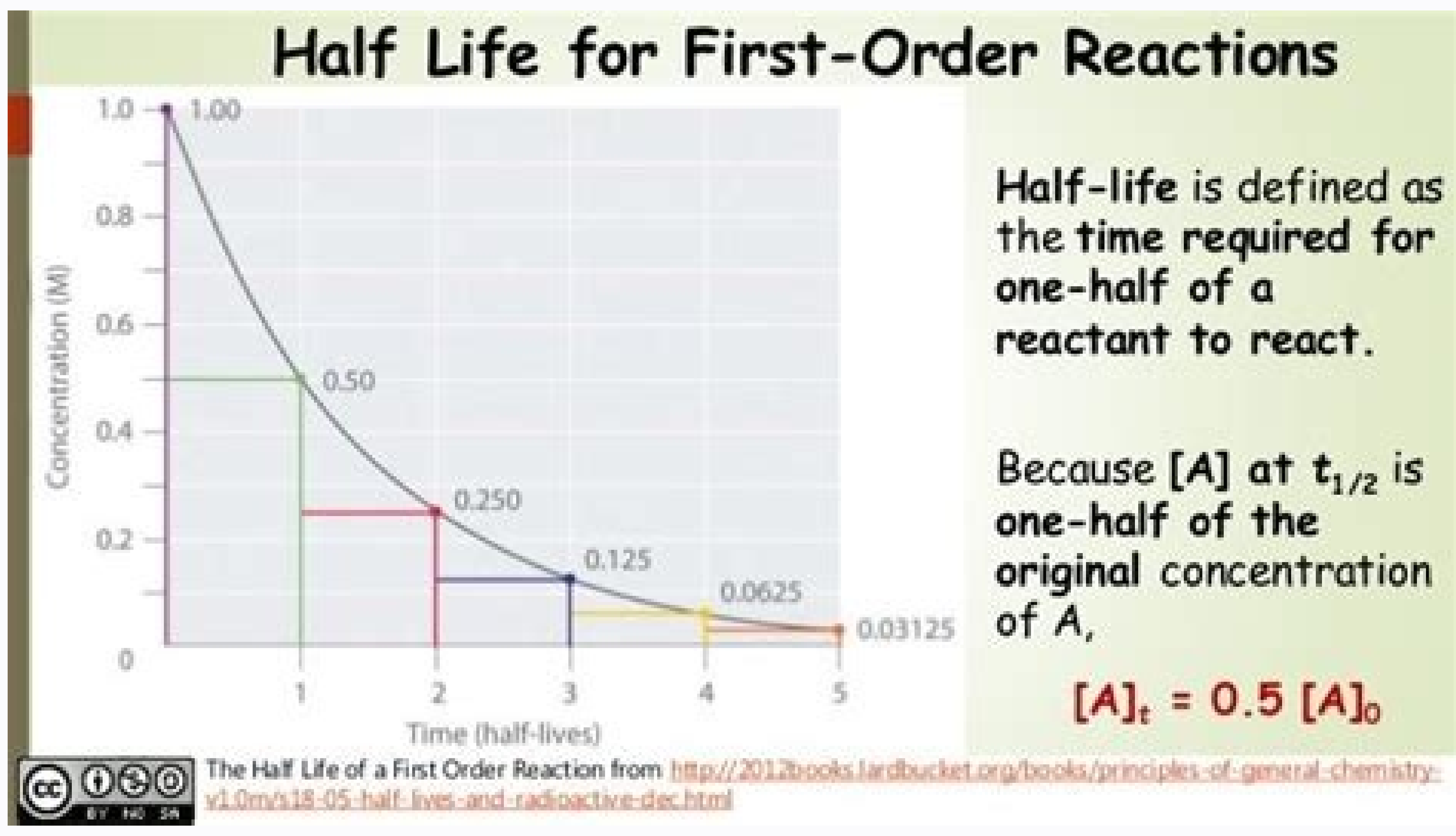
b) **Enzymes catalyze many important chemical reactions in the human body. Name one of these chemical reactions.**

....

c) **Label the image below with the following terms: active site, substrate, enzyme.**

1. a) **Enzymes and their substrates are often compared to a lock and key. This is called the Lock and Key Model. Label the lock and key in the image above.**

1



Kinetics lab report chemistry. Kinetics order of reaction lab report.

Introduction My essay is focused on chemical kinetics, which is only about 100 years old subfield of chemistry. Kinetics is topic, which investigates the speed of reaction. It is worth to investigate because it gives us knowledge about how reactions happen and about reaction mechanisms. As well as this, chemical kinetics can be used in many different areas: for instance, in pharmacology to work out how fast the drug dissolves or in food industry in order to understand food decomposition. This investigation is focused on the kinetics of iodination of acetone and the reaction used in this experiment is following: CH3COCH3 (aq) + I2 (aq) ⇒ CH3COCH2I (aq)+ HI (aq) This reaction is suitable because it is fast enough to make multiple runs, but...show more content...The reaction is first order with respect to propanone and acid, and zero order with respect to iodine. This means that if a concentration of propanone or acid is increased, the rate increases as well, in liner....... However, when the concentration of iodine is changed, the rate is not affected. This is due to it's reaction mechanism. One way the reaction to occur, is explain as following: In the rate equation k is rate constant. The rate constant is independent of the concentrations of substances, but may depend on environmental factors such as temperatures . Therefore, when the concentration of propanone is increased, the value of k stays the same. This property can be used to find k with different concentrations and find the average in order to ensure that the value of k in specific temperature is reliable. In order to calculate activation energy, the rate constant must be calculated in different temperatures, in this particular experiment, rate constant is calculated in following temperatures: 9°C, 22°C, 29°C, 37°C, 45°C. Rate constant can be calculated by dividing the initial rate of the reaction by the concentrations of CH3COCH3 and H+. In this experiment, the units of k are mol−1 dm3...show more content...To ensure the constant rate between HCl and propanone, solutions of propanone and HCl were prepared by following next steps: 100 cm3 of 2M propanone was poured in 250 cm3 measuring cylinder (± 1.5 cm3) 50 cm3 of 2M HCl was poured on the top of propanone (±1.5 cm3) The mixture was poured between two 250 ml flasks Flasks were closed with corks The process was repeated for 5 times but every time the propanone was diluted by 10%. The amounts of propanone, distilled water and HCl were following: 1st solution 2nd solution 3rd solution 4th solution 5th solution CH3COCH3 (cm3) (±1.5 cm3) 100 90 80 70 60 H2O (cm3) (±1.5 cm3) 0 10 20 30 40 HCl (cm3) (±1.5 cm3) 50 50 50 50 50 Therefore, the concentrations of propanone were 2M, 1.8M, 1.6M, 1.4M and 1.2M. Half of the solutions were put in fridge to cool down the solutions and others were left to stay in room temperature over night. Afterwards, for temperatures, 29°C, 37°C and 45°C, solutions were put into water bath to keep temperature constant. Measuring the To determine the rate law for the reaction 2 I− + S2O82− → I2 + 2 SO42− . 1 To relate changes in reactant concentrations to changes in reaction rate. 2 To calculate a rate constant from experimental data. Chemical kinetics deals with the speed, or rate, of a reaction and the mechanism by which the reaction occurs. We can think of the rate as the number of events per unit time. The rate at which you drive (your speed) is the number of miles you drive in an hour (mi/hr). For a chemical reaction the rate is the number of moles that react in a second. In practice, we usually monitor how much the concentration (the number of moles in a liter) changes in a second. Reaction rates are usually expressed in units of moles per liter per second, or molarity per second (M/s). The reaction to be studied in this experiment is a redox reaction between iodide ions and persulfate anions: (1) 2 I− + S2O82− → I2 + 2 SO42− Our definition of reaction rate is the change in concentration with time, but the concentration of which chemical species? The answer is, any of them. For example, we could measure the rate at which I2 is formed. Then the rate would be: This equation states that the rate is equal to the change in I2 concentration divided by the change in time. The units are M/s. We could also measure the rate at which S2O82- is used up. Then the rate would be: (3) Note the negative sign in equation 3. Reaction rates are always given positive values, but the S2O82- concentration is decreasing as the reaction proceeds. (4) Δ[S2O82−] = [S2O82−]final − [S2O82−]initial < 0 Hence, there is a negative sign to make the reaction rate positive. We could also measure the disappearance of I-. In the chemical equation, two iodide ions react with each S2O82- ion. Therefore, I- disappears twice as fast as S2O82-. The reaction rate based on disappearance of I- would be expressed as: (5) The three reactions of importance in this experiment are: (6) 2 I− + S2O82− → I2 + SO42− (7) I2 + 2 S2O32− → 2 I− + S4O62− (8) I2 + starch indicator → blue-black product The purpose of the experiment is to measure the rate of Reaction 6. A product of this redox reaction between iodide ions and persulfate ions (S2O82-) is elemental iodine. Iodine, in the presence of thiosulfate ions (S2O32-) will reform iodide ions (Reaction 7). Iodine can also, in the presence of starch, form a blue-black product (Reaction 8). Reaction 7 is faster than Reaction 8, and occurs preferentially if S2O32- is present. However, if no S2O32- is present, or if it is used up, Reaction 8 occurs and the dark color of the indicator appears. The change in concentration of a chemical species usually depends on the concentration of that species when the reaction begins. At the beginning of the reaction, its concentration is high, and a substantial amount of reactant will disappear in a second. Near the end of the reaction, its concentration is low, and a much smaller amount of reactant will disappear in a second. A standard way to compare reaction rates under different conditions is to measure the time it takes for the first small percentage of reaction to occur. This gives the initial rate. In this experiment, you will find the time it takes for the first small percentage of Reaction 6 to occur. But we do it in an indirect way. The time it takes for Reaction 7 to occur will actually be measured. The experiment will be set up such that the amount of thiosulfate (S2O32-) is only about one percent of the amounts of iodide and persulfate (S2O82-) ions. During the first percent or so of Reaction 6, the elemental iodine produced is consumed by thiosulfate in Reaction 7. No iodine is left to react with the starch indicator. When the S2O32- is used up, Reaction 6 is still going (it still has about 99% to go!), but the iodine produced then begins to react with the starch, giving a color change. Thus, the color change indicates the total consumption of thiosulfate, S2O32-. Knowing the amount of thiosulfate that reacted and measuring the time that it takes to react gives Δ[S2O32-]/Δt. This is related to the rate of Reaction 6 (what we want!) by the stoichiometry of the reactions, (9) Rate = − = − The one half in the formula arises from the 1:2 stoichiometry between S2O82- and S2O32- ions. The term Δ[S2O32-] is negative (the concentration decreases as the reaction proceeds), but the negative sign in the formula again gives a positive value for the rate. A simple question about reaction rates is this: does the rate you measure depend on the amount of reactants you start with? It seems as if it should, but this is not always the case. The answer to the question depends on the mechanism of the reaction. A reaction mechanism is the series of steps that the reaction follows. The slowest step determines the measured reaction rate, and is called the rate-determining step. Look again at the reaction whose rate is to be measured: (10) 2 I− + S2O82− → I2 + 2 SO42− You might guess that this reaction occurs when two iodide and one persulfate ion collide together in solution. However, a collision between three species such that they meet in the correct orientations to react is very rare. Most likely, the reaction proceeds in simpler steps. Some reasonable mechanisms are these: 1 The rate-determining step has two iodide ions coming together. In this case, the rate depends only on the initial concentration of iodide. 2 The rate-determining step involves a persulfate ion decomposing. In this case, the rate depends only on the initial concentration of persulfate. 3 The rate-determining step has an iodide ion and a persulfate ion coming together. In this case, the rate depends on the concentrations of both ions. All of the mechanisms are plausible. The only way to distinguish among them is by experiment. The concentration dependencies are summarized by the rate law. For our reaction, the rate law can be written: (11) Here, k is called the rate constant, which is unique to the reaction. (Do not confuse k, the rate constant, with K, the equilibrium constant!) The exponents x and y must be determined by experiment. We do this by measuring the reaction rate at different initial concentrations of iodide and persulfate. For example, if we double the initial [I-] and the rate does not change, then x must be equal to zero, and the reaction is said to be zero order in iodide ions. If the rate doubles when [I-] is doubled, x must be one, and the reaction is first order in iodide ions. If the rate goes up by a factor of four when [I-] is doubled, x must be two, and the reaction is second order in iodide ions. Doing other experiments and varying [S2O82-] will then allow one to determine y, the reaction order for persulfate ion. Your textbook gives an algebraic method for determining x and y, which must be used for more complicated reaction orders. Once the reaction order for each reactant is determined, one can substitute the values for reactant concentration, order, and rate (change in concentration per unit time) for a given run into the rate law and solve for the rate constant, k. The units of k will vary with the overall reaction order, which is the sum of the individual exponents. Reaction order is an indication of the total number of species involved in the rate-determining step of the reaction mechanism. You will do five runs of the reaction. These will enable you to determine the reaction order in each of the reactants, and calculate the rate constant. You will then determine the rate law for the reaction between iodide and persulfate ions. 50 mL burets 50 mL graduated cylinders 100 mL beakers 50 mL beakers magnetic stir plate magnetic stir bar 10.00 mL volumetric pipet pipet bulb ring stand with buret clamp deionized water squirt bottle 0.200 M KI 0.100 M (NH4)2S2O8 0.0050 M Na2S2O3 0.200 M KCl 0.100 M (NH4)2SO4 3% starch solution Ammonium persulfate is an oxidizing agent. Oxidizing agents can supply their own source of oxygen and may react violently with organic liquids or other reducing agents. The dilute persulfate solutions used in this experiment may be handled safely with other aqueous solutions. The chemicals used in this experiment are very dilute so gloves will not be available. Remember to wash your hands with soap and water when the experiment is completed. All of the solutions can be flushed down the sink with plenty of water. Please read the following sections of Lab Safety and Practices: Good Lab Practices Measurement Volumetric Glassware Please review the following videos under Instructional Videos: Please complete WebAssign prelab assignment. Check your WebAssign Account for due dates. Students who do not complete the WebAssign prelab are required to bring and hand in the prelab worksheet. Please print the worksheet for this lab. You will need this sheet to record your data. 1 Five different solutions with similar names are used in this experiment. Label the glassware so you will not mix things up. For example, 50 mL buret for KI 100 mL beaker for obtaining KI 50 mL beaker for KI dispensed from buret 50 mL buret for (NH4)2S2O8 100 mL beaker for obtaining (NH4)2S2O8 50 mL beaker for (NH4)2S2O8 dispensed from buret 10.00 mL pipet for Na2S2O3 graduated cylinder for KCl graduated cylinder for (NH4)2SO4 100 mL beaker in which to run the reaction Although you are using burets and pipets to measure volumes, you will be dispensing the liquids into beakers, and pouring them from the beakers as you conduct the reactions. Some loss of liquid will occur in these transfers. Therefore, it is not necessary to read the buret to 0.01 mL as you would in a titration. Read to the nearest 0.1 mL (small gradation). 2 The following procedure applies for each run. Make sure the reaction beaker is rinsed and dried between each run. a Use your KI buret to measure the appropriate amount of 0.200 M KI into the labeled beaker. b Use your (NH4)2S2O8 buret to measure the appropriate amount of 0.100 M (NH4)2S2O8 into the labeled beaker. c Use a pipet to measure 10.00 mL of Na2S2O3 into the reaction beaker. Add 3 or 4 drops of starch solution. d Use a graduated cylinder to add KCl or (NH4)2SO4 solution to the reaction beaker if it is required for the run. These solutions are added to maintain a constant concentration of ions in all the runs. e Add the magnetic stir bar to the reaction beaker and mix the contents of the reaction beaker. f This step needs to be carefully coordinated. While the contents of the reaction beaker are being stirred, add the KI and (NH4)2S2O8 solutions simultaneously to the reaction beaker. This is the initial time for the reaction. g Watch the reaction and note the time at which the blue-black color of the starch-iodine complex appears. Record the elapsed time in Data Table A. Table A: Determination of Rate Law: 2 I− + S2O82− → I2 + 2SO42− Question 1: What are the initial concentrations of iodide, persulfate, and thiosulfate in the first run? Account for dilution and show your work. Question 2: What is Δ[S2O32-] at the time of the color change in the first run? Question 3: What is the rate of the reaction in the first run? Show your work. 3 Record the values from these calculations in Data Table B. Repeat the calculations for the other four runs. Table B: Calculations for Determination of Rate Law Question 4: Inspect the data in Data Table B. What is the order of the reaction with respect to iodide ions? Explain how you arrived at your answer. Question 5: Inspect the data in Data Table B. What is the order of the reaction with respect to persulfate ions? Explain how you arrived at your answer. Question 6: Write the rate law for this reaction, showing the proper exponents. Question 7: Calculate the rate constant for the first run. Include units. Show your work, and record the result in Data Table B. 4 Calculate the rate constants for the other four runs and record the rate constants in Data Table B. 5 When you are finished, rinse all of your glassware with water, dry it and return it to the set-up area where you found it. 6 Before leaving, enter your results in the in-lab assignment. If all results are scored as correct, log out. If not all results are correct, try to find the error or consult with your lab instructor. When all results are correct, note them and log out of WebAssign. The in-lab assignment must be completed by the end of the lab period. If additional time is required, please consult with your lab instructor.

The course assumes no prior knowledge of chemistry and begins with basic concepts. Topics include an introduction to the scientific method, dimensional analysis, atomic structure, nomenclature, stoichiometry and chemical reactions, the gas laws, thermodynamics, chemical bonding, and properties of solutions. Co-Requisite: CHM-113L. CHEM 125. Foundations of Chemical Inquiry II. 2 hours. Laboratory in general chemistry including chemical thermodynamics, spontaneity, chemical equilibrium, acid-base equilibrium, electrochemistry, kinetics, bonding, order/symmetry in condensed phases, coordination compounds, and spectroscopy. The Whys and Hows of Writing a Lab Report. This author provides an excellent student lab-report format, explains how it adapts to different science disciplines, and suggests simple labs to familiarize students with it. ... Chemical Kinetics and Equilibirum; Chemical Reactions; Chemicals; Chemistry Demonstration Kits; Chemistry Properties of ... Lecture 80 minutes, lab 5 hours. Prerequisite: 01:160:251. 01:160:351 Inorganic Chemistry (3 cr) Application of bonding theory (ionic, molecular orbital, ligand field) to understand acids/bases, redox reactions, and the chemical and physical properties of transition metal and main group inorganic compounds. Environmentally Safe (green) Chemical Reactions to Prepare Antiviral & Ion Channel Blocker Analogs. Read More. Recent Publications. Wang Group "Probing the Electronic Structure and Bond Dissociation of SO3 and SO3– using High-Resolution Cryogenic Photoelectron Imaging" D. ... Topics include equations of state; classical thermodynamics and its application to chemical equilibrium in reaction systems, multiphase systems, and electrochemical cells; kinetic theory of gases; transport properties; chemical kinetics. May not be taken for credit by students who have completed CHE 301. Not for credit toward the chemistry major. Jul 13, 2022 · Lesson 4 - Chemistry Lab Equipment: Supplies, ... Chemical Reactions: ... Kinetics: Take a look at factors affecting chemical reaction rates. Explore the ... Kentchemistry.com is the premiere chemistry education website on the internet for college and high school students. The sites main purpose is to simplify chemistry, so every student can succeed. The website contains topic links with walkthrough tutorial videos, chemical demonstration videos, a library of New York State Chemistry Regents Exams with the ... Jun 15, 2019 · The Haber-Bosch process, which converts hydrogen and nitrogen to ammonia, could be one of the most important industrial chemical reactions ever developed. The process made ammonia fertilizer ...

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