Four factors that affect the rate of chemical reactions

What are the 4 factors that affect the rate of reaction. What are the 4 factors that affect the rate of chemical reaction. Four major factors that affect the rate of chemical reactions. What four factors influence the rate of chemical reactions.

Activation energy The activity energy of the chemical reactions only a small fraction of the collides between the reagent molems convert the reagents into reaction products. This can be understood by turning once again for the reaction between CLNO2 and NO. CLNO2 (g) + NO2 (g) + + CLNO (g) In the course of this reaction, a chlorine article is transferred from a nitrogen to the other. In order for the reaction to occur, the nitrogen in the NO should collide with the chlorine articles in CLNO2. Reaction will not occur if the oxygen end of the collides no molems with the chlorine articles in CLNO2. It will also not occur if one of the oxygen articles in CLNO2 collides with the nitrogen in the NO. Another factor that influences the fact that the reaction will occur is the energy of the moleps transport when they collide. Not all the molems have the same cycle energy, as shown in the figure below. This is important because the cyante energy molems transport when they collide is the main source of energy that should be invested in a reaction to get it started. The global free standard energy for the reaction between CLNO2 and the favorable is. CLNO2 (g) + NO2 (g) + + CLNO (g) IR = -23.6 kJ / Mol But before reagents can be converted into products, free energy system should overcome energy Activation for the reaction of, as shown in the figure below. The vertical axis in this diagram represents the free energy of a pair of molemples, such as a chlorine artery is transferred from one to the other. The horizontal axis represents the sequence of infinitely small changes that should occur to convert reagents into products of this reaction. To understand why the reactions have an energy of activity, consider what has to happen so that CLNO2 to react with no. First, and above all, these two molems that collide, so organizing the system. They do not have to be gathered, they have to be held in exactly the right guidance on each other to ensure that the reaction can occur. Both of these factors increase free energy system, reducing entropy. A little energy should also be invested to begin to break the cl-no2 van so that the CL-NoCle can form. NO and CLNO2 molemats that collide with the correct orientation, with sufficient kinetic energy to climb the activation energy barrier, can react to form No2 and CNO. As the system temperature increases, the number of molems that carry enough power to react when they also collide increases. The reaction rate therefore increases with the temperature. As a general rule, the rate of a folding reaction for each increase of 10 ° C at the temperature of the system. Purists may notice that the symbol used to represent the difference between the free energies of the products and the reagents in the figure above is Go, will not. A small capital "g" is used to remind us that this diagram tracing free energy from a pair of moleps as they react, not the free energy of a system that contains many pairs of moleps submitted The collision. If we calculate the results of this calculation over the entire range of molems in the system, we would like to get the change in system free energy, go. Purists can also notice that the symbol used for Representing the energy of activation is written with a "E". This is regrettable because it takes students to believe that the energy of activity is the variation of the internal energy of the system, which is not quite true. And measures the change in the potential energy of a pair of molems that is needed to start the conversion process of a pair of reagent molemats with a pair of product moleplets. Catalysts and reaction rates chemical aqueous solutions of hydrogen peroxide are stable â € â € œWe add a small amount of iÃ £ o I, a piece of metal platinum, a few drops of blood, or a slice recently of turnip, height in which the peroxide of hydrogen decompose rapidly. 2 H2O2 (aq) 2 h 2 (aq) + O2 (g) this reaction reaction It provides the basis for the understanding of the effect of a catalyst on the speed of a chemical reaction. Four criteria must be satisfied for something to be classified as catalyst. Catalysts increase the speed of the reaction. The catalysts are not consumed by the reaction. A small amount of catalyst should be able to affect the reaction speed for a large amount of reagent. Catalysts do not change the equilibrium constant for reaction. The first criterion provides the basis for defining a catalyst as something that increases the reaction rate. The second reflects the fact that anything consumed in reaction is a reagent, not a catalyst. The third criterion is a consequence of the second; Because catalysts are not consumed in the reaction, which can catalyze the reaction from one over and over again. The fourth criterion results from the fact that catalysts accelerate the rates of forward and reversed reactions therefore, therefore, the equilibrium constant for the reaction remains the same. Catalysts increase reaction rates by providing a new mechanism that has a smaller activity energy, as shown in the figure below. A greater proportion of collages that occur between reagents now have sufficient energy to overcome activity energy for the reaction. As a result, the reaction rate increases. To illustrate how a catalyst can decrease the activity energy for the reaction, providing another route to the reaction, let's look at the mechanism for the decomposition of peroxide Hydrogen catalyzed by I- I-. In the presence of this ion, the decomposition of H2O2 does not have to occur in a single step. It can occur in two stages, both are more convenient and therefore faster. In the first step, i Ã æm is oxidized by H2O2 to form hypoodyite ion, hi-. H2O2 (aq) + I (aq) H2O (aq) + oi- (aq) in the second step, the oi- is reduced ion for i- per H2O2. Oi- (aq) + H2O2 (aq) H2O (aq) + O2 (g) + I (aq) because there is no liquid changes in the concentration of ion I, as The result of these reactions, the ion I- satisfies the criteria of a catalyst. Since H2O2 and I are both involved in the first step in this reaction, and the first step for this reaction is the limiting step of speed, the overall speed of the reaction © first order in both reagents. Determine the activation energy of a reaction the rate of a reaction depends on the temperature to which it is administered. As the temperature increases, the molems move faster and therefore collide more frequently. The molems also carry more cycle energy. Thus, the proportion of collages that can exceed the activation energy for the reaction increases with the temperature. The only way to explain the relationship between the temperature and the reaction rate is to assume that the speed constant depends on the temperature to which the reaction is performed. In 1889, Svante Arrhenius showed that the relationship between the temperature and the speed constant for a reaction obeyed the following equation. In this equation, K is the speed constant for reaction, Z is a constant of proportionality that varies from a reaction to another, and is the energy of activity For the reaction, R is the constant of ideal gases in Joules by Mole Kelvin, and T is the temperature in Kelvin. Arrhenius equation can be used to determine the activation energy for the reaction. We began to have taken the natural logarithm on both sides of the equation. Then reorganize this equation to fit the equation for a straight line. y = mx + b according to this equation, a graphic representation of ln k versus 1 / t should give a straight line with a slope of - and / r, as shown in the figure below. By paying a lot of attention to the mathematics of logarithms, it is possible to derive another form of arrhenius equation, which can be used to predict the effect of a temperature change in the speed for a reaction. The arrhenius equation, also can be used to calculate what happens at the speed of a reaction when a catalyst reduces activation activation Learning objectives to obtain a understanding of collision theory. To get a understanding of the four main factors that affect the reaction rate. Reaction Cinema is the study of the chemical reaction rate, and reaction rates can vary greatly on a wide variety of time scales. Some reactions can proceed at explosively reasons as the detonation of artifain fireworks (figure 17.1 Ã â € ¬ œ fireworks at night around the river ¢ ¬), while others may occur At a slow rate over many years as the rusting of the barbed wire exposed to the elements (figure 17.2 Ã â € ¬ Å "Nusted Barbed Wire ¢ €). Figure 17.1. Fireworks at night on the river Chemical reaction in the fireworks of artifice happens at an explosive fee. Figure 17.2. Rusted barbed wire rust from barbed wire takes place over many years. The theory of collision to understand the kinemic of chemical reactions, and the factors that affect the kinema, we must first examine what happens during a reaction on the molecular level. According to reactivity collision theory, reactive reagent molemats occur "collide effectively. For an effective" collision ", reactive molems should be oriented in space correctly to facilitate the Bonds and the training of bonds and the rearrangement of articles resulting in the formation of product moleps (figure 17.3 Ã â € ¬ "Collision viewsÃ ¢ â €, ¬ Å "). Figure 17.3. Collision viewing This visualization shows an ineffective and effective collision based on molecular guidance. During a molecular collision, the molems also Must have a minimum amount of cystic energy so that an effective collision occurs. This energy varies for each reaction, and is known as activity energy (EA) (figure 17.4 Ã ¢ â € "Energy and activationâ €"). The reaction rate depends, therefore, the activity energy; A higher activity energy means that less molemates will have enough energy to go through an effective collision. Figure 17.4. Potential and activity energy The potential energetic diagram shows the activity energy of a hypothytic reaction. Factors affecting the fee There are four main factors that can affect the reaction rate of a chemical reaction: 1. Reagent concentration. Increasing the concentration of one or more reagents will often increase the reaction rate. This is because a higher concentration of a reagent will take more collides of this reagent in a specific time permit. 2. Physical state of reagents and surface area. If reagent molems exist at different phases, as in a heterogeneous mixture, the reaction rate will be limited by the superficial area of the phases that are in contact. For example, if a solid metal reagent and the gas reagent are mixed, only the molems present in the metal surface are capable of colliding with the groan molemps. Therefore, increasing the metal surface area, beating it or cutting it into many pieces will increase your reaction rate. 3. Temperature. An increase in temperature usually increases the reaction rate. An increase in temperature will increase the cinematic energy of the reagent molems. Therefore, a larger proportion of molemats will have the necessary minimum energy for an effective collision (figure. 17.5 Ã ¢ € ¬ "temperature and reaction rate Ã ¢ â € , ¬). Figure. 17.5 Temperature and temperature reaction effect on cycle cell distribution of molemples in a sample 4. Presentialation of a catalyst. A catalyst is a substance that accelerates a reaction participating without being consumed. Catalysts provide an alternate reaction route for products. They are chronic for many biochemical reactions. They will be examined even more in the Section Ã ¢ â € ‡ Å "catalisise.â € â € â € ƒâ € ƒâ € ƒâ € Correct. Reagent concentration, the physical state of the reagents and surface area, and presence of a catalyst catalyst Main factors affecting the reaction rate. to assess.