Chemistry 3202 Outcomes

Unit One Reaction Rates

Saw It	Know It	
		describe Collision Theory and its connection to factors involved in altering reaction rates
		state the Kinetic Theory of Matter (KMT)
		describe two pieces of evidence that support the KMT Pressure Diffusion
		state the Collision Theory
		recognize that reaction rate can be measured by monitoring a variety of macroproperties, including: Mass Colour Volume pH
		relate the rate of reaction to the number of successful collision between reaction particles
		define, draw and label on a potential energy diagram for exothermic and endothermic reactions (one-step mechanisms), include: Activation energy Activated complex ΔH Reactants and products
		identify and discuss the properties and situations which affect reaction rates
		explain using collision theory how temperature, concentration/pressure, surface area and nature of reactants affects the rate of reaction
		describe the effect of a catalyst on the rate of reaction
		describe a reaction mechanism and a catalyst's role in a chemical reaction
		define a reaction mechanism as a series of elementary processes which determine the reaction rate and when added together result in an overall balanced equation
		define an elementary process as a single step reaction in a multi-step reaction mechanism
		define a reaction intermediate as a substance which is produced by an elementary process, only to be consume by a later elementary process

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		define rate determining step (RDS) as the slowest elementary process in the reaction mechanism, which is the step that determines the overall reaction rate
		sketch a potential energy diagram for a given reaction mechanism which shows an energy barrier for each step and the energy barrier of the RDS relative to that of all other elementary processes
		given a reaction mechanism with the RDS identified, determine all catalysts, intermediates, the overall balanced equation and state the effect of changing a reactant concentration on the overall rate
		state that a catalyst speeds up a chemical reaction by means of providing an alternate mechanism ("alternate pathway")
		draw and label a one-step potential energy diagram to show the effect of a catalyst on the reaction
		define the concept of dynamic equilibrium as it pertains to reversible chemical reactions
		state the criteria that apply to a system at equilibrium; closed system with constant temperature, constancy of macroscopic properties, evidence of reversibility, and equal rates of forward and reverse process
		describe the steps in which a chemical system attains dynamic equilibrium
		write and interpret chemical equations for chemical systems at equilibrium
		explain how the different factors affect chemical equilibrium
		explain how the forward and reverse reaction rates in a chemical equilibrium are affected by changes in the: Temperature Pressure Concentration (of one reactant or product) Volume of a chemical equilibrium
		state Le Châtelier's Principle
		use Le Châtelier's Principle to predict, qualitatively, shifts in equilibrium caused by changes in: Temperature Pressure Volume Concentration
		use Le Châtelier's Principle to determine how the concentration of a reactant and/or product changes after a change is imposed on an equilibrium (not relative to initial conditions)
		explain why the addition of a catalyst and varying surface area of a

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		reactant or product do not cause the equilibrium to shift, yet, both factors do have an effect on the time it takes for a system to reach equilibrium
		explain the roles of evidence, theories, in Le Châtelier's Principle
		complete a lab on Le Châtelier's Principle to see how stress affects equilibrium and apply Le Châtelier's Principle to the changes made to this system at equilibrium
		define the concept of equilibrium constant expression as it pertains to chemical equilibrium systems
		write equilibrium constant expression, K, for chemical systems
		recognize that solids and liquids are not included in the equilibrium expression, K
		recognize that the constant, K, will vary with temperature
		calculate equilibrium constants for simple chemical systems when concentrations at equilibrium are known
		calculate equilibrium concentrations for simple chemical systems when K and all other equilibrium concentrations are known
		predict whether or not reactant or products are favoured in a reversible reaction, on the basis of the magnitude of the equilibrium constant
		solve K_{eq} problems involving the initial concentrations, the changes that occur in each substance, and the resulting equilibrium concentrations
		calculate equilibrium concentrations for simple chemical systems when: • Initial concentrations of reactants and one equilibrium concentration are known • Initial concentrations of reactants and the percent reaction is known
		calculate equilibrium constants, K, for simple chemical systems when: • Initial concentrations, and one equilibrium concentration are known • Initial concentrations, and the percent reaction of one of the reactants are known