

Week 11

Be able to determine reaction rates from experimental data

Determine the rate law using the method of initial rates

Be able to derive integrated rate laws from differential rate laws

Determine half-life from integrated rate law

Determine reaction order from the relationship between concentration and reaction time.

Be able to relate the rate law for a given reaction to a possible reaction pathway

Describe the function of catalysts, both homogeneous and heterogeneous, in chemical and biological systems

Week 12

Be able to write equilibrium constant expressions and calculate values for the equilibrium constant from concentrations (K) and pressures (K_p)

Know how to use the reaction quotient and the equilibrium constant to predict the direction in which a system will move to reach equilibrium

Be able to calculate equilibrium concentrations given initial concentrations

Know how to use Le Chatelier's principle to predict the changes that occur when a system at equilibrium is disturbed

Week 13

Know how acids and bases are defined in the Arrhenius model, Bronsted-Lowry model, and the Lewis model

Be able to write an equilibrium constant expression from the acid/base dissociation reaction

Know how acid/base strength is related to the position of the dissociation equilibrium

Be able to convert between pH, pOH, $[H^+]$, $[OH^-]$, K , and pK

Be able to calculate pH of solutions of strong and weak acids (including polyprotic) and bases

Be able to calculate percent dissociation

Know how to identify conjugate bases and conjugate acids

Be able to explain why certain salts give acidic or basic solutions and calculate the pH of these solutions

Be able to use Lewis structures, bond strength, and polarity to explain acid-base properties and strengths

Week 14

Explain the characteristics of buffered solutions and in general how to prepare a buffer solutions

Calculate a buffer pH given the concentrations of the buffering chemicals

Be able to apply the concept of buffering capacity to choose the optimal buffer solution at a given pH

Calculate the pH at any point in an acid-base titration

Be able to discuss the function of acid-base indicators and determine the pH at which a color change will occur for a given indicator