**Kinetics Review**

*MC TOPICS*

Understand factors that affect reaction rates (and why the rates increase or decrease).

How is rate defined? Appearance vs disappearance? Relationship to stoich of rxn? (instantaneous rate)

Rate law = k[A]m[B]n: exponents usually 0,1,2 but fractions are possible

How to determine order from DATA. Overall reaction order?

Units of the rate constant k?

Know which graphs match 0,1,2 order rxns.

Know how to use integrated rate laws given on the reference sheet for 0,1,2. Use half-life equation for 1st order.

Recognize that half-life is constant for 1st order (see graph). 0th and 2nd order half-life depend on initial [ ].

Effect of Temperature

k is T dependent (collision model: more collisions per sec so more frequent, higher energy, in correct orientation, rate approx. doubles every 10oC

Activation Energy (Ea) -minimum KE needed to react increase temp and more molecules will have Ea (no calcs)

Reaction Mechanisms

Reactions occur in steps which add up to overall reaction

Steps are ELEMENTARY single steps (unimolecular and bimolecular most common; termolecular rare)

Intermediates vs catalysts

Rate laws of elementary steps can be written bases on coefficients

Overall rate law determined by the SLOW step

SLOW initial step. Reaction rate law will match this step.

Activation of initial step is higher and smaller rate constant than subsequent steps

Catalyst changes the mechanism. Provides alternate pathway with lower Ea. Homogeneous vs heterogeneous.

*FRQs*

#1 SEVERAL steps.

Use experimental data to determine order of reaction with respect to reactants. (data is realistic NOT perfect)

Write rate law. R= k….

Determine value and units of k (hint: mol L-1 is Molarity)

Calculate the initial rate

Calculate time to reach a new [ ] using integrated rate law. (formulas for 0th, 1st, and 2nd on ref sheet)

Evaluate a proposed mechanism. Identify intermediates or catalysts.

Examine effect of changes

#2 Color change reaction with Absorbance change over time DATA. A = abc (or A = εbc)

VERY important to remember that absorbance is directly proportional to concentration.

Be able to examine change in data to predict order.

Pseudo rate constant concept. (similar to both of our labs)

Spectroscopy

#3 Evaluation of graphs to determine reaction order.

READ graph for data to make calculation.

Rate constant