2.1.3.2: The Rate of a Chemical Reaction

The rate of a chemical reaction is the *change* in concentration over the *change* in time.

Introduction

The rate of a chemical reaction is the *change* in concentration over the *change* in time and is a metric of the "speed" at which a chemical reactions occurs and can be defined in terms of two observables:

1. The Rate of Disappearance of Reactants

$$-\frac{\Delta[Reactants]}{\Delta t}$$

   Note this is negative because it measures the rate of disappearance of the reactants.
2. The Rate of Formation of Products

$$\frac{\Delta[Products]}{\Delta t}$$

   This is the rate at which the products are formed.

They both are linked via the balanced chemical reactions and can both be used to measure the reaction rate.

> ## Outside links
> - http://en.Wikipedia.org/wiki/Reaction_rate
> - www.chm.davidson.edu/vce/kinetics/ReactionRates.html(this website lets you play around with reaction rates and will help your understanding)
> - goldbook.iupac.org/R05156.html
> - www.youtube.com/watch?v=FfoQsZa8F1c YouTube video of a very fast exothermic reaction.

References

1. Petrucci et al. <u>General Chemistry: Principles & Modern Applications, 9th Edition</u>. New Jersey: Prentice-Hall Inc., 2007.
2. Connors, Kenneth. <u>Chemical Kinetics: The Study of Reaction Rates in Solution</u>. New York City: VCH Publishers, Inc., 1990.

Problems

1. Consider the reaction $2A + B \longrightarrow C$. The concentration of [A] is 0.54321M and the rate of reaction is $3.45 \times 10^{-6} M/s$. What Concentration will [A] be 3 minutes later?
2. Consider the reaction $A + B \longrightarrow C$. The rate of reaction is 1.23*10-4. [A] will go from a 0.4321 M to a 0.4444 M concentration in what length of time?
3. Write the rate of the chemical reaction with respect to the variables for the given equation.

$$2A + 3B \rightarrow C + 2D$$
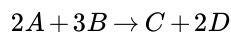
4. True or False: The Average Rate and Instantaneous Rate are equal to each other.
5. How is the rate of formation of a product related to the rates of the disappearance of reactants.

Contributors

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