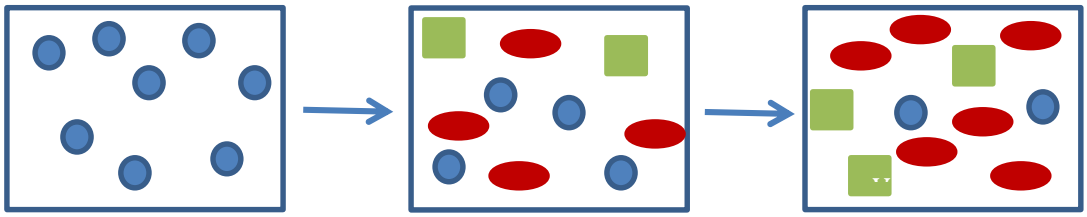
Kinetics: Rate of Chemical Reactions

The diagram below depicts the progress of a reaction. Each shape and color represents a different substance. The three boxes represent the concentrations of each substance as the indicated time elapses. Refer to the diagram to answer questions 1 – 4.



Time = 0 seconds Time = 15 seconds Time = 30 seconds

1. Select all images that represent reactants. There may be more than one reactant.
   a. 
   b. 
   c. 

2. Which statement is ***true***?
   a. The rate of change of substance  is twice the magnitude as the rate of change of substance  .
   b. The rate of change of substance  is equal to the rate of change of substance  .
   c. The rate of change of substance  is twice the magnitude as the rate of change of substance  .
   d. The rate of change of substance  is equal in magnitude but opposite in sign to the rate of change of substance  .

3. If each colored image represents 0.10 M of the substance, determine the rate (in M/s) of change of substance  over the first 15 seconds.

Kinetics: Comparing Rate of Change for Reactants and Products

1. Consider the following reaction:

   $$2N_2O_5(g) \rightarrow 2N_2O_4(g) + O_2(g)$$

   If, at some point during the reaction, the rate of disappearance of N_2O_5 is 0.15 M/s, what is the rate of appearance of O_2?

2. Consider the following reaction

   $$4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$$

   At some point during the reaction, the rate of appearance of NO is 0.0100 M/s. What is the rate of disappearance of O_2 at this same point in the reaction?

Kinetics: The Rate Law

1. The rate law of the reaction

$$2H_2(g) + 2NO(g) \rightarrow N_2(g) + 2H_2O(g)$$

is rate = $k[H_2][NO]^2$. Which of the following statements is/are ***false***?

   a. The reaction is 3rd order overall.
   b. The reaction is 2nd order in H_2.
   c. The reaction is 2nd order in NO.
   d. The reaction is 1st order in H_2O.

2. The rate law of the reaction

$$2H_2(g) + 2NO(g) \rightarrow N_2(g) + 2H_2O(g)$$

is rate = $k[H_2][NO]^2$. What will be the effect on the rate of the reaction if the concentrations of both H_2 and NO are doubled?