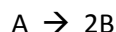


Rxn Kinetics/Rxn Rates

The rate of a rxn is determined by calculating the change in concentration [Molarity] per unit time.

Sometimes we measure the amount of reactant consumed, sometimes it's measured by the amount of a product created.

$$\text{Rate} = \Delta [M] / \text{Time}$$



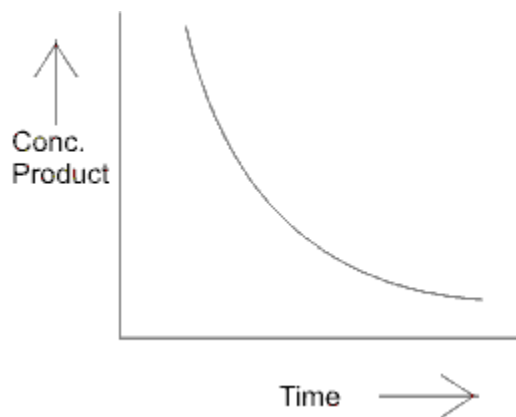
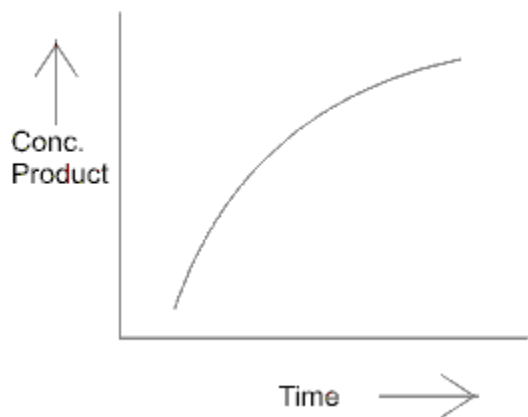
Molar concentration A	Time (seconds)
10.00 M	0
6.00 M	2.00
4.00 M	4.00
3.50 M	6.00
3.30 M	8.00

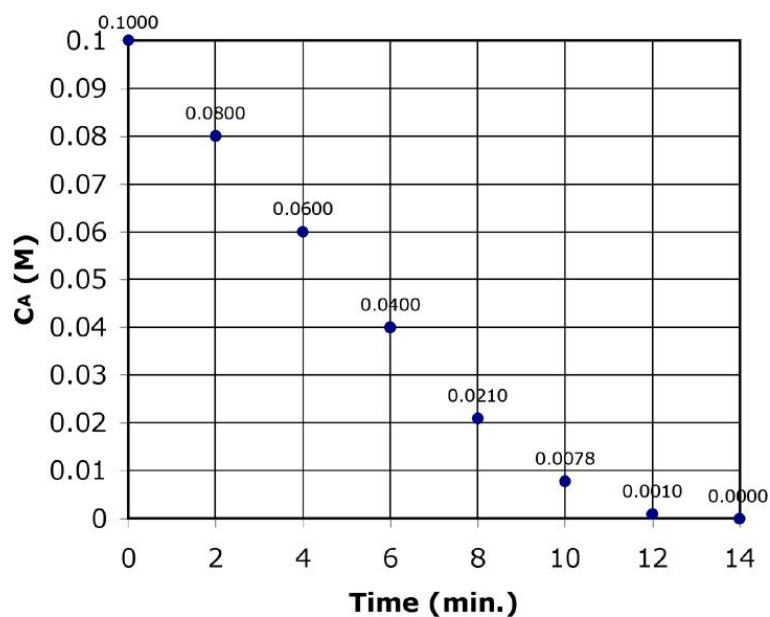
Time interval	Rate of the rxn: M sec ⁻¹ Reactant A	Rate of the rxn : M sec ⁻¹ Product B
1		
2		
3		
4		

Average rate and instantaneous rate are different measurements. Notice that the rate of the reaction is NOT constant, but gradually slows down as time proceeds. This is true for all reactions. Therefore when you calculate rates from data tables, they are always averages for that time interval. To get an instantaneous rate you need a graph.

Graph the above data, Placing time on x and concentration on y.

What is the shape of the curve? Find the instantaneous rate at 3 seconds and 7 seconds by finding the slope of the tangent line at these two points.





Use the above graph to answer the following questions

1. What is the half life of this reaction?
2. What is the average speed of this reaction from during the 14 minute time interval? What are the units for the speed/rate?
3. Is Ca a reactant or product? How can you tell?
4. Using the graph provided what is rate of the rxn for A at 15 seconds?
5. Using the graph provided what is the rate of the rxn for B at 2.5 days?

Rate Laws

1. If a rxn is first order with respect to A and 3rd order with respect to B, what is the rate law for this rxn?

2. The following are elementary rate laws.

Rxn #1 **rate = k [A]¹**

Rxn #3 **rate = k [C]³**

Rxn #2 **rate = k [B]²**

Rxn #4 **rate = k [E]¹[D]²**

Tell what will happen to the rxn when the concentration is changed.

Rxn #1 :The rate for this rxn at room temperature is **5.0 M s-1**

Double [A]

Triple [A]

Cut [A] in ½

Rxn #2: The rate for this rxn at room temperature is also **5.0 M s-1**. What will happen to the rate when you....

Double [B]

Triple [B]

Cut [B] in ½

Raise [B] 5 x

Rxn #3: The rate for this rxn at room temperature is also **0.002 M min-1**. What will happen to the rate when you....

Double [C]

Triple [C]

Cut [C] in ½

Rxn #4: The rate for this rxn at room temperature is also **1.5 M day-1**. What will happen to the rate when you....

Double [E] and Double [D]

Triple [E] and leave [D] unchanged

Cut [E] in ½ and triple [D]