

## Success 24/7 Chemistry: Rates of Reaction 101

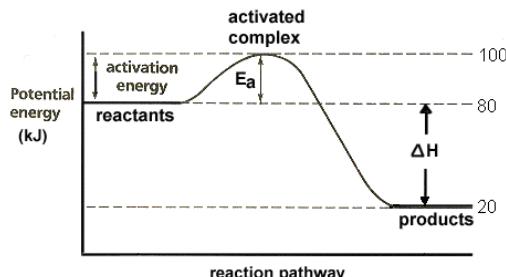
### Rates of Reaction

- ❑ Rate – a measure of the speed of any change that occurs within an interval of time.
- ❑ Reaction Rate - change in concentration of a reactant or product per unit time
  - Some reactions go very fast (burning) and others go very slowly (rusting).

### Collision Theory:

- ❑ In order to react, two or more particles must collide with sufficient energy (called the activation energy) and with the proper molecular orientation. If the colliding particles do not have either of these two prerequisites, no product is formed.

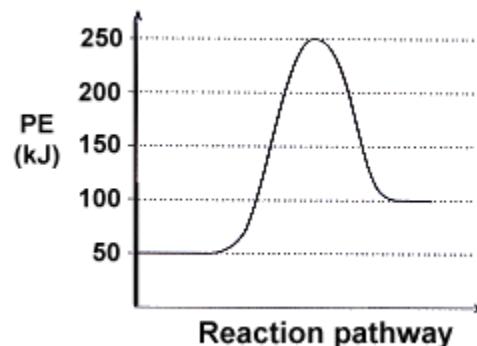
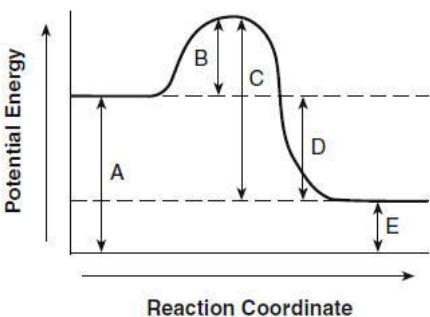
### Potential Energy Diagrams:



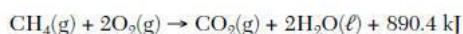
- ❑ Activated complex - (also called transition state) - high energy temporary arrangement of atoms that forms when particles collide with sufficient energy.

Using the graph below, what is the energy of each of the following:

- reactants? \_\_\_\_\_
- products? \_\_\_\_\_
- activation energy? \_\_\_\_\_
- activated complex? \_\_\_\_\_
- ΔH? \_\_\_\_\_
- Endothermic or exothermic? \_\_\_\_\_



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- products? \_\_\_\_\_
- activation energy? \_\_\_\_\_
- activated complex? \_\_\_\_\_
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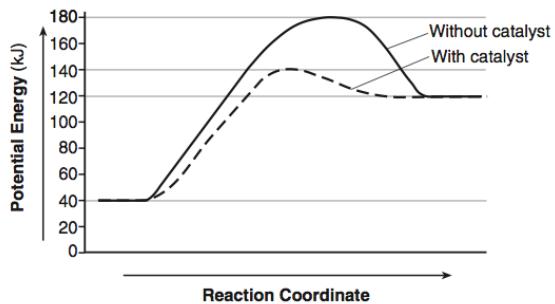
### Factors that affect reaction rate:

- Temperature - Reactions go faster at higher temperatures. Particles have more kinetic energy. More colliding particles have enough energy to overcome the activation energy barrier.
- Concentration - Increasing the concentration of reactants usually increases the reaction rate. If there are more particles to collide, there should be a greater number of collisions that produce products.
- Particle size - Increased surface area increases reaction rate. Again, more particles collide.

Catalysts - A catalyst is a substance that speeds up a reaction by lowering the activation energy barrier. It is not a product or reactant and it is not used up or changed itself.

Enzyme- Biological catalyst

Inhibitor- Substance that blocks the action of a catalyst



- reactants? \_\_\_\_\_
- products? \_\_\_\_\_
- activation energy? \_\_\_\_\_
- activated complex? \_\_\_\_\_
- $\Delta H$ ? \_\_\_\_\_
- Endothermic or exothermic? \_\_\_\_\_