

Rates of Reactions

Why do some reactions happen quickly, while others occur more slowly?

- **Rate of Reaction**

- how fast (or slow) a reaction happens

- **Kinetic Molecular Theory**

- model which explains how chemical reactions happen

- a) all matter is made up of particles

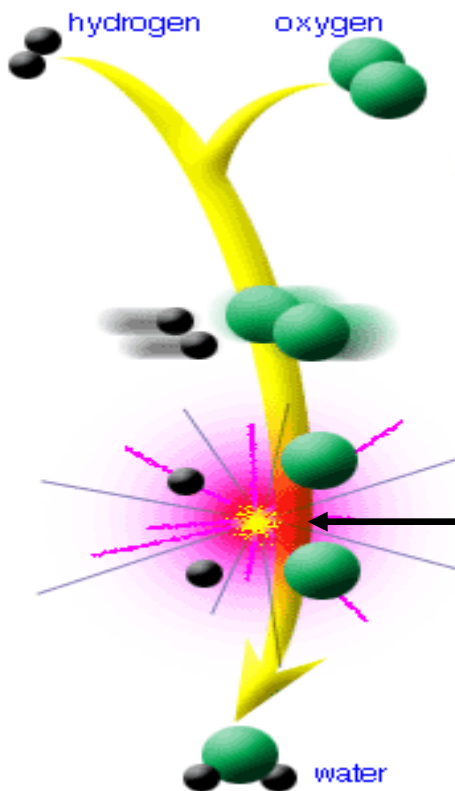
- b) these particles constantly move

- c) while moving, they collide with other particles

- d) if they hit hard enough, chemical bonds between particles can break

- e) the particles are then free to bond with other particles

= **Collision Model of Chemical Reactions**



The rate of a reaction is affected by how many collisions each molecule makes.

There are two ways to speed up a chemical reaction:

1) increase the # of collisions

2) increase the # of effective collisions

There are four factors that influence the rate of a reaction:

1. Temperature

- most important factor in speeding a reaction up
- most reactions proceed faster at higher temperatures
- as temperature increase, the movement of the molecules increases which means they come into contact and collide with more molecules harder

2. Concentration

- the more molecules present, more collisions can occur
- increasing the concentration of a reactant usually increases the rate of reaction

3. Surface Area

- surface area is how much of a reactant is visible and available to react
- different phases (s,l,g) changes the amount of surface area
- surface area increases as the sizes of the pieces of reactant decreases
- more surface area means more particles can react

4. Catalysts

- substances that increase the rate of a reaction but do not react themselves (they aren't changed so they aren't a reactant)
- makes it easier for the reaction to proceed
- decreases the amount of collisions needed to break bonds and form new ones
- increases the # of effective collisions.

5. Agitation

- stirring, shaking or in some way physically mixing the reactants together
- agitation speeds the movement of the molecules so they collide more often and harder

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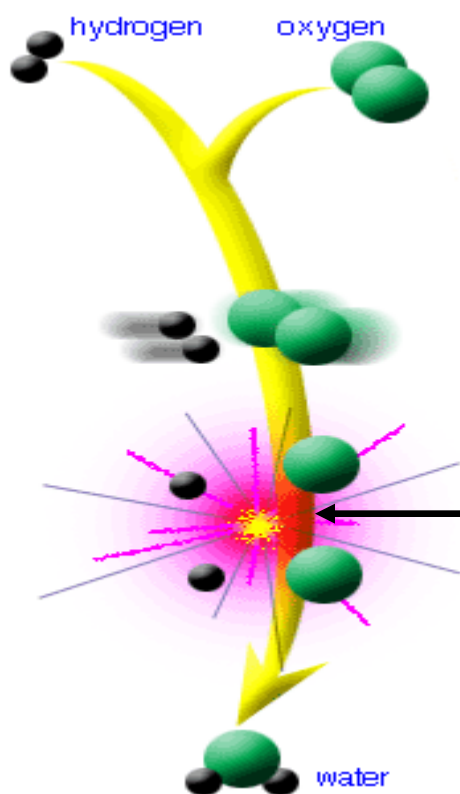
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Questions:

1. What evidence do you have that a chemical reaction took place between the Alka-Seltzer and water?
2. Which of your procedures increased the reaction rate the most? Suggest a reason for this.
3. Which of your procedures resulted in the slowest reaction rate? Why?
4. Cooking is a chemical change. What effect will increasing the oven temperature have on the baking time of cookies? Explain.
5. When fruit is cut into pieces, it spoils quicker than if it is left uncut. Why does this occur?