

Chemical Reactions (RXNS)

Biology is applied Chemistry: to understand Biology, we need to understand physics, chemistry and math.

I. All chemical reactions can be divided into **two types of reactions**:

1. **Exothermic/Exogonic reactions**- *releases energy*, gives off energy during the time of the reaction. (Hint: Exude, Exit, Exert); Thermic= heat
~Reactants have more energy at the beginning, Products have less at the end.

Example: ball falling from desk to floor; less energy when ball is on the floor.

2. **Endothermic/Endogonic reactions**- these require *energy input* to complete the reaction. (Hint: Endo= IN); Thermic= Heat

~Reactants possess less energy at the beginning and products have more energy at the end.

Example: raising the ball from desk to ceiling; energy must be added to make this happen.

Spontaneous reaction: a reaction when once it begins, it will continue until completion; reactions that happen on their own; exothermic reactions are spontaneous, but they need a little help—need a little energy to get started, this is called activation energy.

~ spontaneous reactions are reactions that once begun will run to completion. (Once the ball begins to fall from the table, it will continue to fall until it hits the floor).

At the beginning of a reaction: you have reactants.

At the end, you have products.

Exothermic= more energy beginning, less at end. Energy is given off.

Endothermic= less energy beginning, more at end.

For Chemical Reactions to occur:

~ you must have reactants, and

~the molecules must be moving.

!!!!~Two molecules must physically collide (bang into each other) with enough force to break the existing bonds and allow new bonds to form.

Stability vs. Reactivity:

~High stability = low reactivity, Low stability= high reactivity

~Stable molecules react slowly, unstable molecules react quickly.

If you do not see a physical change right away, then you can conclude that the molecules are more stable. The molecules might be colliding but not with enough force.

~How can you get stable molecules to react?

One way to get stable molecules to react is to ---Add heat

~Heat can make molecules collide with more force.

Apply to Living Things:

Living things depend on chemical reactions to continue living.

These reactions are stable. Problem—they don't react easily.

Another problem—unstable molecules react too easily.

Living things must get stable molecules to react.

One way: Heat—Why do we have a 98.6 degree body temperature? To get stable molecules to react. Ex. Fever can be positive response to kill off viruses. But--Too high (105 degrees can be fatal)

Another way: Enzymes

Activation Energy- is a measurement of how hard two molecules must collide in order to react

When stability is high and reactivity is low- activation energy is high (need more activation energy to get started colliding)

When unstable, need less activation energy.