6-3: Controlling Chemical Reactions

8th Grade Physical Sciences
6-3: Controlling Chemical Reactions

Activation Energy

- Don’t Write
- I can’t get the fire to start!!!
- Need more friction – ENERGY !!!
- Activation Energy !!!
6-3: Controlling Chemical Reactions

Activation Energy

- Chemical reactions often need some energy put into them to get them started – or – to get the reactant’s bonds to break.
Activation Energy

• Activation energy is the minimum amount of energy required to start a chemical reaction.

• All reactions require some energy to get started.
6-3: Controlling Chemical Reactions

Activation Energy

Exothermic Reaction

Energy

Reactants

Time

Products

Activation energy

Heat released

Endothermic Reaction

Energy

Reactants

Time

Products

Activation energy

Heat absorbed
6-3: Controlling Chemical Reactions

Activation Energy

- Ping pong balls on mousetraps would be an example of an exothermic reaction.
6-3: Controlling Chemical Reactions

Activation Energy

- Electrolysis would be an example of an endothermic reaction.
6-3: Controlling Chemical Reactions

Rate of Chemical Reactions

- Some reactions are fast and some are slow.
- Conditions can change the rate at which reactions occur.
6-3: Controlling Chemical Reactions

Rate of Chemical Reactions

- To get reactions to speed up, you need to get more reactants together, more often.
- To slow it down, you do the opposite.
6-3: Controlling Chemical Reactions

Rate of Chemical Reactions

• Four factors that affect the rate are:

  1. Surface area
  2. Temperature
  3. Concentration
  4. The presence of catalysts or inhibitors.
6-3: Controlling Chemical Reactions

Surface Area

- Breaking reactants into smaller pieces increases the surface area that can react.
6-3: Controlling Chemical Reactions

Surface Area

- Breaking reactants into smaller pieces increases the surface area that can react.

- Grain on the ground burns slow — but when it is a dust floating around, it is explosive!!!
6-3: Controlling Chemical Reactions

Temperature

- Higher temperatures mean more collisions between reactants.
- They also have more energy – easier to reach activation energy levels.
6-3: Controlling Chemical Reactions

Concentration

- Higher concentrations of reactants allows more reactants to react.
- Concentration is the amount of substance in a given volume.
Catalysts

• A **catalyst** is a material that speeds up the rate of a chemical reaction by lowering the activation energy.
6-3: Controlling Chemical Reactions

**Catalysts**

- In biology, these are called **enzymes**.
- Without enzymes, your body would need to be very hot for its necessary reactions to take place.
Inhibitors

- An inhibitor is a material used to slow down a chemical reaction by keeping reactants apart.
- Water keeps $O_2$ from touching the hot wood.
6-3: Controlling Chemical Reactions

Summary

• Chemical reactions require activation energy to start the reaction – whether they are exothermic or endothermic.

• There are 4 ways to control reaction rates; surface area, temperature, concentration, and catalysts/inhibitors.

• Catalysts in living organisms are called enzymes.