Proton: The positively charged subatomic particle found in the center of an atom.

Neutron: The neutrally charged subatomic particle found in the center of an atom.

Nucleus: The center of an atom, where the mass is located. The nucleus is composed of protons and neutrons.

Electron: The negatively charged subatomic particle that moves rapidly around the outside of an atom.

Molecule: A particle made from two or more atoms bonded together.

Element: A pure substance composed of only one type of atom. It cannot be broken down into simpler components because all the components are the same type of atom.

Compound: A pure substance composed of only one type of molecule. It can be broken down into simpler components because a molecule is composed of different types of atoms.

Ion: An atom that has lost or gained electrons and becomes positively or negatively charged. When the number of protons equals the number of electrons an atom is neutrally charged. Losing or gaining electrons causes the number of protons and electrons to be unequal, resulting in the creation of the ion, which is a charged particle.

Isotope: An atom that has lost or gained neutrons, resulting in a slightly different mass than other atoms of the same element.

Covalent bond: A force that holds two atoms together. In a covalent bond, moving electrons travel around the nucleus of both atoms. The atoms stay together because their nuclei are attracted to the same electrons.

Ionic bond: A force that holds two atoms together. In an ionic bond, electrons are transferred from one atom to another. This creates a positive ion and a negative ion. The atoms are attracted to one another because they are oppositely charged.

Van der Waal’s forces: When MOLECULES (not atoms) are attracted to each other. This is a specific type of attraction that occurs because electrons spend more time on one side of the molecule than on another. This causes a partial negative charge on the side the electrons spend the most time on and a partially negative charge on the side electrons spend the least amount of time. The partial charge on one molecule is attracted to the partial negative charge on the other molecule.

Polarity: When an electron spends more time on one side of a molecule than the other, resulting in a partial positive charge on one side of the molecule and a partial negative charge on the other.

Hydrogen bond: A special kind of Van der Waal’s force that is a result of hydrogen being attached to an oxygen or nitrogen. In this case, the electrons spend very little time around the hydrogen resulting in a very large polarity, which makes a very strong Van der Waal’s force.
Cohesion: Attraction between molecules of the same substance.

Adhesion: Attraction between molecules of different substances.

Element versus Compound

<table>
<thead>
<tr>
<th>Element</th>
<th>Compound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Made from only one kind of atom</td>
<td>Made from two or more bonded atoms</td>
</tr>
<tr>
<td>Cannot be broken down in a chemical reaction</td>
<td>Can be broken down in chem. reaction</td>
</tr>
<tr>
<td>Represented by a single element symbol</td>
<td>Represented by two or more symbols</td>
</tr>
</tbody>
</table>

Mixture: Substance that is composed of molecules of at least two different elements or compounds that are not bonded to each other.

Three major types of mixtures:
- Suspension: Small particles of one substance are suspended (floating) in another kind of substance. These particles will eventually fall out of suspension over time.
- Solution: A solute substance is broken into ions that are surrounded by solvent molecules.
- Colloid: Small particles of one substance are surrounded by solvent molecules and permanently suspended.

Acid: A substance with a concentration of hydronium ions (H+) higher than pure water.

Base: A substance with a concentration of hydroxide ions (OH-) higher than pure water.

pH: A measurement of the hydronium ion (H+) of a substance. Water is pH 7. Acids have pH under 7. Bases have a pH greater than 7.

Macromolecules: Molecules formed by combining smaller compounds together to create a larger compound in a process called polymerization.

Carbohydrates: A polymer made from Carbon (C), Hydrogen (H), and Oxygen (O) with a ratio of 1:2:1
Uses in the body: Energy, Creating structures in some organisms like plants

Lipids: A polymer made from glycerol and three fatty acids.
Uses in the body: Store energy, Form membranes, Form waterproof barriers

Nucleic Acids: A polymer made from a 5-Carbon sugar, Nitrogenous base, and Phosphate group.
Uses in the body: Transmits genetic information

Protein: A polymer made out of amino acids. Amino acids have –NH2 on one end and –COOH on the other. There are 20 amino acids, which can be combined in many different orders and numbers.
Uses in the body: Control reaction rates, Regulate cell processes, Form bone, Form muscle, Transport things through cell membranes, Fight diseases.

Chemical Reaction: Process where the starting substances (called reactants) have their bonds broken and then rearranged. When the reaction is complete it produces new substances (called products).
Exothermic: Chemical reactions that release energy to the environment. These often occur spontaneously.

Endothermic: Chemical reactions that absorb energy from the environment. These rarely occur spontaneously.

Spontaneous Reaction: A reaction that might need energy to start but continues without absorbing additional energy from the environment.

Enzyme: A molecule that affects the rate of reactions in cells.

Activation Energy: The energy it takes to start a reaction. This is the energy needed to break bonds in the reaction and cause the resulting particles to have enough energy that when they collide with other particles they can react.

Substrate: Some chemical reactions involve enzymes. In these reactions the reactants are called the substrate.

Active site: The site (place) on an enzyme to which the substrates attach.

Enzyme-Substrate Complex: This is formed in a chemical reaction in which an enzyme is involved. During the reaction, there is a step where the substrate is briefly attached to the enzyme. This combination of substrate/enzyme is called the enzyme-substrate complex.

Activated complex: Stage in a reaction where the reactants are broken apart and the resulting particles have collided with other particles needed to make the product. If there is sufficient energy this will continue on to form the products. If there is not sufficient energy the activated complex will break apart without forming products.

How can enzymes increase a reaction rate?

The enzymes form an enzyme-substrate complex, which hold the particles in the correct orientation so they are much more likely to form the activated complex. This can significantly lower the amount of activation energy needed for the chemical reaction to proceed.

Control of enzymes

1. Controlled by pH
2. Controlled by temperature
3. Controlled by other proteins that turn the enzyme on or shut it off