

Vocabulary: Chemical Energy

- Activation energy – the energy required to start a chemical reaction.
 - For example, the heat from a glowing splint can allow oxygen to react with hydrogen to form water.
 - In many cases the reaction will proceed on its own once the activation energy has been supplied.
- Catalyst– a substance that increases the rate of a chemical reaction without being altered by the reaction.
 - A catalyst usually lowers the energy required to initiate the reaction.
 - Because the catalyst is unchanged by the reaction, it can be recovered from the reaction and reused.
- Chemical energy – *potential energy* that is released or absorbed in chemical reactions.
 - In most cases, chemical energy is released when atoms form bonds.
- Covalent bond – a chemical bond in which atoms share a pair of valence electrons.
 - Covalent bonds form between nonmetal atoms.
- Elastic potential energy – potential energy that is stored when an object is stretched or compressed.
 - Examples of objects that store elastic potential energy include the following:
 - Stretched rubber band
 - Stretched (or compressed) spring
 - A bow that is pulled back
- Electrostatic forces – forces between charged objects.
 - Opposite charges (positive and negative) will attract one another.
 - Similar charges (positive-positive or negative-negative) will repel one another.
- Endothermic reaction – a chemical reaction in which heat is absorbed from the environment.
 - Endothermic reactions cause cooling.
- Enthalpy – the sum of the internal energy of a system (E) plus the product of the pressure (P) and volume (V) of the system: $H = E + PV$.
 - As long as pressure remains constant, the change in enthalpy is equal to the change in heat of a system.
- Exothermic reaction – a chemical reaction in which heat is released into the environment.

- Gravitational potential energy – potential energy that depends on an object’s position within a gravitational field such as that exerted by Earth.
 - On Earth, an object’s gravitational potential energy depends on the object’s weight and height above Earth’s surface.
 - The formula for gravitational potential energy is $GPE = wh$ or $GPE = mgh$.
- Ionic bond – a bond formed by the attraction between two oppositely charged ions.
 - Positively charged ions attract negatively charged ions and vice versa.
 - Positively charged ions repel positively charged ions.
 - Negatively charged ions repel negatively charged ions.
- Kinetic energy – energy of motion.
 - The formula for kinetic energy is $KE = mv^2 \div 2$.
- Latent heat of fusion – heat absorbed by a substance as it melts.
- Latent heat of vaporization – heat absorbed by a substance as it *vaporizes*, or boils.
- Metallic bonding – chemical bonds formed by the attraction between positively-charged metal ions and a “sea” of free-floating electrons.
 - Unlike the electrons in ionic or covalent bonds, the electrons in metallic bonds are not constrained to any one atom or molecule.
 - Metallic bonding gives metals many of their unique qualities, including conductivity, malleability, and ductility.
- Potential energy – the energy an object has because of its position or shape.
 - Potential energy that is dependent on an object’s position above Earth is known as gravitational potential energy.
 - Potential energy that is dependent on an object’s shape (such as a stretched rubber band) is known as *elastic potential energy*.
- Polarity – separation of electrical charge in a molecule.
 - Polar molecules have one end with a positive charge and one end with a negative charge.
 - Water molecules are polar.