# 8th Grade Power Notes - CHEMISTRY

1. PARTICLE MOTION
	1. Atoms behave differently in solids, liquids, and gases: **SOLID**= atoms are tightly packed and barely moving. **LIQUID**= atoms are becoming more spread apart and sliding over one another. **GAS=** atoms are moving around rapidly in all directions; spread apart the greatest.
	2. Increasing or decreasing the temperature of a material can cause a change of state (**physical change**= ex. from a solid to a liquid)
	3. Increasing the temperature during a chemical change (ex. adding baking soda to warm vinegar) will increase the rate of a reaction (make it go faster) or vice versa.
	4. Atoms are always moving- even in solids! Remember also that atoms are the smallest basic unit of an element and are composed are subatomic particles (protons, neutrons, and electrons).
2. PHYSICAL VS. CHEMICAL PROPERTIES AND CHANGES
	1. **Physical properties** (color, density, thermal conductivity, electrical conductivity, melting and boiling points, solubility, and magnetic properties) **are independent of the amount of sample**. (Information is consistent no matter how much of the substance you’re sampling)
	2. Remember that whenever a substance undergoes any type of change **MASS IS CONSERVED.** The Law of Conservation of Mass states that mass cannot be created or destroyed, only changed. This is what is meant by the statement, “*matter is conserved*”.
	3. **Physical change-**a change that affects the physical properties of a substance (does not change chemical identity)
		1. candle wax melting, ripping paper, boiling/freezing water (change of state), crushed soda can
	4. **Chemical change-** a change of the chemical identity of a substance; creates an entirely new substance
		1. burning wick (any combustion), rusting, any chemical reactions (new color, makes odor, etc.)
3. ****DENSITY – a physical property describing the amount of mass in the given amount of space (volume).

 FORMULA: D=M/V

1. ELEMENTS and COMPOUNDS
	1. **Element**- basic unit on the periodic table. Ex.: Nitrogen (N), Oxygen (O), Calcium (Ca), Sodium (Na)
	2. **Compound**- a substance made of two or more elements. Ex.: NaCl, KNO3, C6H12O6, CH4
2. SOLUBILITY – the ability of a substance to dissolve into another substance (*physical property*)
	1. **Solute** (ex. sugar) is dissolved by the **solvent** (ex. tea) to make a **solution** (sweet tea).
	2. A gas like oxygen (solute) could also dissolve into a liquid solvent (ex. the ocean).
3. PERIODIC TABLE- a visual tool created by scientists that organizes all of the known elements in the universe based upon their similar properties
4. THE pH SCALE- describes if a substance is an acid (1) or base (14)
	1. ****Ex. the pH of acid rain is ~ 2, the pH of normal rain is 5.5, and soap is around 10.
5. CELLULAR RESPIRATION AND PHOTOSYNTHESIS
	1. When matter is exchanged between organisms on earth, the MATTER IS CONSERVED (Note II.b. above).
	2. Photosynthesis takes place in the chloroplasts of plants. Light is captured by chloroplasts and converted into chemical energy (glucose). Plants are autotrophs (make their own chemical energy). Photosynthesis uses carbon dioxide, water, and sunlight (reactants) to produce oxygen and glucose (products).
	3. Cellular Respiration takes place in mitochondria of both plant and animal cells. Cellular respiration allows an organism to convert glucose into usable cell energy (ATP). Cellular respiration uses oxygen and glucose to produce carbon dioxide, water, and ATP.
	4. The reactants for PS are the products for CR and vice versa

# 8th Grade Power Notes - ASTRONOMY

1. ORGANIZATION OF THE UNIVERSE
	1. The universe is composed of billions of complex systems called **galaxies**. Each galaxy can be composed of trillions of **stars**. If a star has celestial bodies orbiting it, it is classified as a **solar system**. Objects that orbit a star include **planets, comets, and asteroids.**
	2. The distances between space are so large that miles/kilometers are not traditionally used. Instead, scientists use LIGHT YEARS to measure distance in space. A light year is the amount of time it takes light to travel at its constant speed (3.0 x 108 m/s) in a vacuum for an Earth year.
	3. Within our own solar system, a shorter distance system is used called **Astronomical Units**. **1 A.U.**= distance from the Earth to the Sun
	4. 

 W = MOON

X = EARTH

Y = SUN

Z = MILKY WAY

* 1. **Nebulae** are giant clouds of gas that are considered “star nurseries”. The highly pressured gas is a perfect place for new stars to form.
1. PROPERTIES OF STARS
	1. Stars are classified by their magnitude (brightness), temperature (which gives color), and size.
	2. MAGNITUDE –
		1. **Absolute magnitude** – the actual brightness of a star, regardless of distance from viewpoint
		2. **Apparent magnitude** – not the actual brightness; how bright the star *appears* from viewpoint
		3. Ex. Betelgeuse is an incredibly large and bright star. It has a high absolute magnitude. However, from Earth, the apparent magnitude is small. The sun is the opposite. From Earth, the sun has an enormous apparent magnitude. In reality, the sun is much smaller than Betelgeuse. The sun has a smaller absolute magnitude than Betelgeuse.
	3. TEMPERATURE – Red stars are the lowest temperature, blue stars are the highest temperature. From lowest to highest temperature: Red, orange, yellow, white, blue-white, blue
	4. SIZE – Stars can vary in size. SIZE DOES NOT DETERMINE COLOR, TEMPERATURE DOES!!!
2. PROPERTIES OF PLANETS
	1. Planets closest to the Sun are terrestrial (rocky) planets. (Mercury, Venus, Earth, Mars)
	2. There is an asteroid belt that separates the rocky and gas giant planets (Jupiter, Saturn, Uranus, Neptune).
	3. The rocky planets are much smaller and have thinner atmospheres. Mercury does not have an atmosphere (most likely because it is so close to the sun: the atmosphere would evaporate).
	4. Larger planets have a stronger gravitational attraction to objects in space (Law of Universal Gravitation). This is why Jupiter has so many moons (67 discovered so far!).
	5. Pluto is no longer classified as a planet; instead we classify Pluto as a dwarf planet.
3. ECLIPSES
	1. **Solar eclipse**- the sun is “eclipsed” or blocked by the moon. The moon is **in between** the Sun and Earth.
	2. **Lunar eclipse**- the moon is “eclipsed” by Earth. Earth is between the moon and sun.
4. TIDES – Caused by gravitational pull of the sun and moon. (moon more, it’s closer!)

**SPRING TIDE**= strongest; moon,earth, and sun aligned

**NEAP TIDE** = 90° angle (L shape) formed by moon, earth, and sun