Chemistry and Atoms!

8th grade history information to help you understand the background of how our knowledge grew through the years.
Chemistry lies at the roots of civilization!

- Chemical reactions are the strange transformations that reveal matter’s hidden properties.
- The first chemical reaction observed by early man was FIRE!
This (fire) was important because it revealed hidden properties of matter.

- Experiments with fire led to other chemical reactions such as cooking.
- Besides food, early man also began to cook other things.
- One material he cooked was rocks!
A strange thing happened when green crumbly rocks were melted. . . . . . . . .

• They turned into an orange liquid that cooled into shiny metallic copper.
This discovery of cooking rocks led to other discoveries.

• Early man also was able to melt red rocks into iron, bake mud into bricks, and saute fat and ashes into soap.
Different theories have been put forth about the secrets of matter.

- Greek intellectuals came up with different theories.
- The Atomists, led by Democritus thought matter was made of tiny INDIVISIBLE particles.
Aristotle believed there were really four elements, air, earth, fire and water from which all else was composed.
The most influential idea was Aristotle’s. If everything was a mixture of 4 elements. . . .

• then it must be possible to turn anything into anything by just tweaking the ingredients.
Chemistry spread across Medieval Europe under the name “ALCHEMY.”

• Early chemists tried to make gold from other substances including urine!!
In medieval times, alchemists used to believe that a certain substance held special magical powers.

• These special magical powers gave the ability to turn normal metals into gold or silver.

• This certain substance was known as the philosopher’s stone.
Some looked for the universal solvent failing to realize that water was it.

- Others looked for the *Elixir Vitae*, a substance to extend life.
- Although alchemists did not discover the philosopher’s stone, they did accomplish a lot. They perfected distillation, filtration, and titration.
They also advanced glassmaking, metallurgy, explosives and corrosives:
Alchemist lab techniques did miss one big thing—they failed to collect gases!

• This meant they could never account for the ingredients or products of chemical reactions!!
The study of gases began in the 1600’s with investigations into the effects of air pressure.

• Otto Von Guericke performed an experiment where he sealed two metal hemispheres together.

• He then inserted a valve and pumped the air out of the interior. When the sphere closed it formed a vacuum which two horses could not even pull apart!
However, when Otto Von Guericke let the air back in, the two hemispheres separated easily.

- In England during the 1770’s, while Joseph Priestly experimented with ‘airs’, in France, Antoine-Laurent Lavoisier was also experimenting with gases. His experiment proved that air was a mixture of two different gases which meant air was NOT an element.

- The French Chemist named it oxygen. He was also known as the Father of modern chemistry.
Lavoisier made chemistry an independent science which earned him the title of “Father of Modern Chemistry.”

• Such discoveries led John Dalton to revive matter’s atomic theory. He reasoned that each element was made of tiny indivisible atoms.
Dalton thought that the atoms of any one element were all alike, but different from the atoms of other elements.

- Compound substances were composed of fixed groupings of atoms called molecules.

A molecule is the smallest amount of a chemical substance that can exist. Essentially, a compound is a type of molecule. A molecule can be made up of two or more atoms of the same element or two or more atoms of different elements. However, compounds are molecules that are made up of atoms of different molecule.
By the 1860’s many new elements had been discovered.

- Chemists made an important observation. It appeared that some elements were more alike than others. It was almost as if elements had families like people!
In 1869, A Russian chemist named Mendeleev decided to arrange the elements in order of increasing atomic mass.

- The result was a table with the elements arranged in rows.
The elements showed a periodic or repeating pattern. Each column contained chemically similar elements.

- With this table Mendeleev was able to successfully predict new elements that would fill gaps on his table. However, an important question still lingered, how to explain chemistry.

- It seemed the secret to chemistry required understanding of the: 

ATOM!
Now we will watch three clips that have to do with our learning in the chemistry and atom world.

• 1. Hennig Brand and the discovery of the element phosphorus.

• 2. A cartoon about the Atomic Theory—TED Ed

• 3. Bill Nye and the greatest discoveries in chemistry

• All great stuff. Sit up and enjoy your learning!!
• Remember—no notes BUT listen well.