# PAST AND PRESENT








# ARRANGERS






# OF

# CHEMICAL ELEMENT SYSTEMS

Before the **philosophers** of Ancient Greece recorded their thoughts, humans had learned to make tools, hunt, farm, make fire, and mine ore.

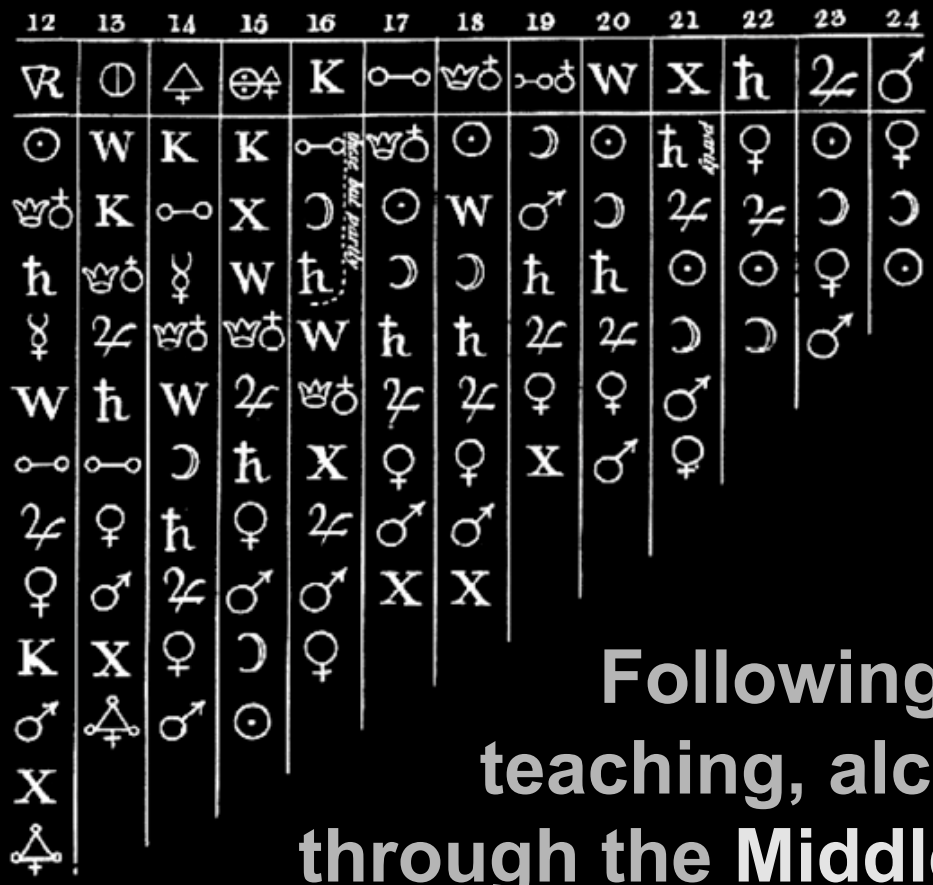
The **stone age** had ended with the **bronze age**, then the **iron age** and cities brought enough leisure for some to contemplate the world at large pretty much full time.

**Democritus**, an ancient Greek philosopher, held that that everything is already in the world, and these eternal bits of immutable stuff called ‘atomos’ **combine and recombine** to make everything.

Previously, **Leucippus** of Miletus held that everything in the universe was made from an arrangement of atoms that move in a vacuum, like some of the earlier ideas of **Anaxagoras**.

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| E<br>Earth | W<br>Water | A<br>Air | F<br>Fire |
| | | | 5<br>Et<br>Ether |

Another ancient Greek philosopher, **Aristotle**, believed that there were **5 basic elements** that made up all things. He scoffed at the atom idea of Democritus', and this misdirection misled Europeans into **Alchemy** for centuries.



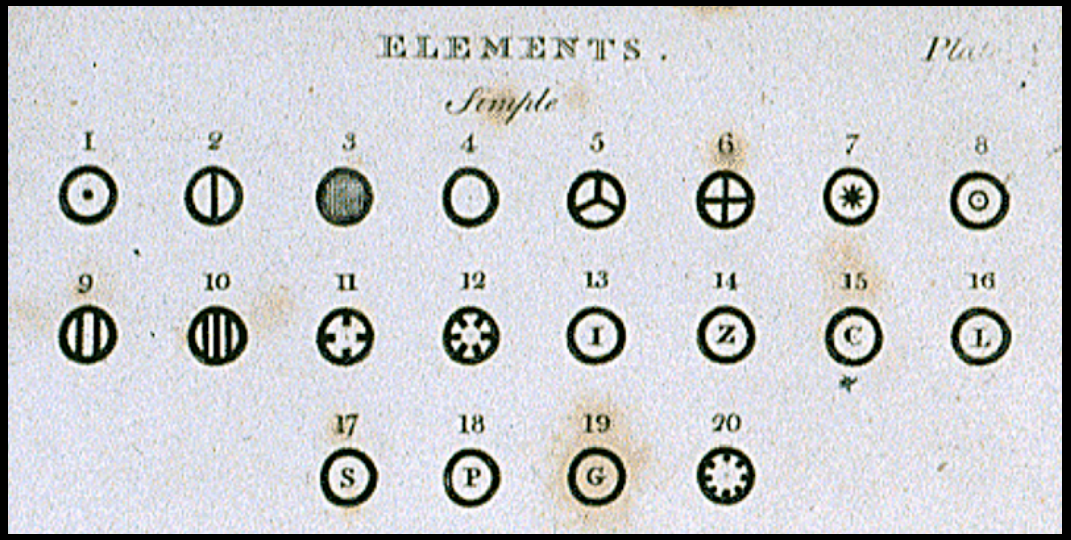

Following **Aristotle's** teaching, alchemists, all through the **Middle Ages**, tried to control the changing of one substance into another, preferably gold – the dot in a circle of **Denis Diderot**'s **affinities chart.**

**Antoine-Laurent de Lavoisier**, by careful experiments, proved alchemy wrong, earning the title of '*the father of modern chemistry*', grouping his 33 '*simple substances*' by properties he had observed.

| | | |
|---|---|---|
| | Nickel..... | Nickel. |
| | Or..... | Or. |
| | Platine ..... | Platine. |
| | Plomb ..... | Plomb. |
| | Tungſtène..... | Tungſtène. |
| | Zinc ..... | Zinc. |
| | Chaux..... | Terre calcaire, chaux. |
| | Magnéſie ..... | Magnéſie, baſe du ſel d'epſom. |
| *Subſtances ſimples ſaliſiables terreuſes.* | Baryte ..... | Barote, terre peſante. |
| | Alumine ..... | Argile, terre de l'alun, baſe de l'alun. |
| | Silice ..... | Terre ſiliceuſe, terre vitrifiable. |

In 1803, **John Dalton** was the first to suggest symbols to represent elements, quickly had a table of 20, and eventually made 36 symbols.

He also refined the concept of properties of what he called **ATOMS**.



Using **Avogadro's Hypothesis** - that *equal volumes of gases at the same temperature and pressure contain an equal numbers of particles* - **Stanislao Cannizzarro** brought order to the confusion about atomic weights in **1860**, showing differences between molecular and atomic weights, leading to greater accuracy.

**Experimentation** had ended **Alchemy**, elements were named and relationships among them better understood, ready for arrangement into forms useful for the work of **modern chemistry**.

Thanks for watching.