

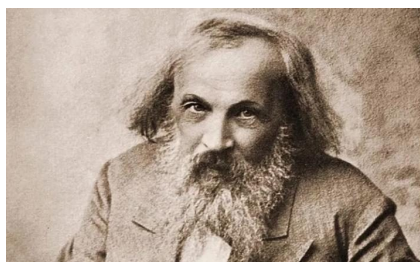


## Organizing the Elements

- Few elements were known for thousands of years
- As of 1700, only 13 elements had been identified.
- 5 more were discovered between 1765 and 1775 (including H, N, and O)
- Chemists needed to find a way to organize all of the elements.

- Chemists used the properties of elements to sort them into groups
- Elements were originally grouped into triads that shared similar properties (Chemist J.W. Dobereiner - 1829)

- 1869 - Dmitri Mendeleev published a periodic table that could be used to predict the elements.



<https://www.youtube.com/watch?v=0RRVV4Diomg>

- Mendeleev arranged the elements in his periodic table in order
- Blanks were left in his periodic table to show that elements with certain properties were yet to be found.



## The Periodic Law

- When Mendeleev first organized the table, it was organized by atomic mass.
- This caused problems with pairs of elements in the table (ex - Te and I)
- Mendeleev did not know that the atoms in each element contain a unique number of protons.
- In the modern periodic table, elements are arranged in order of increasing atomic number.

- There is a repetition of properties with the elements when we look at the **periods (rows, series, left to right)** and **groups (columns, families, up and down)**
- The period number gives the number of energy levels in an atom. The group number gives the number of electrons in an outer level (for the representative elements).

- **The periodic law:** When elements are arranged in order of increasing atomic number, there is a periodic repetition of their physical and chemical properties.



## Metals, Nonmetals, and Metalloids

- For scientists to communicate clearly, they need to agree on the standards they will use.
- The *International Union of Pure and Applied Chemistry (IUPAC)* is an organization that sets the standards for chemistry.

- Three classes of elements are metals, nonmetals, and metalloids.
- Across a period, the properties become less metallic and more nonmetallic.

- Metals - about 80% of elements are metals

Metals	Nonmetals
good conductors of heat and electricity	poor conductors of heat and electricity (*Exception is carbon)
high luster (reflects light)	dull (absorbs light)
ductile - pulled into wires	
malleable - hammered or bent	brittle
solids	solids, liquids, and gases
lose electrons to form positive ions	gain electrons to form negative ions

- Metalloids (8 elements on either side of the staircase)  
\*exception is aluminum, which is a metal
- Have properties of both metals and nonmetals

