Science Subject for Middle School:

Atoms: What are they?

Making up everything that matters...

NGSS Standard

MS-PS1-1 Matter and its Interactions

Develop models to describe the atomic composition of simple molecules and extended structures.
Performance Expectation Grade: Middle School (6-8)

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Matter and The Periodic Table

An introduction to matter and the way that we categorize it

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Atoms

The basic unit of Matter: They make up everything!

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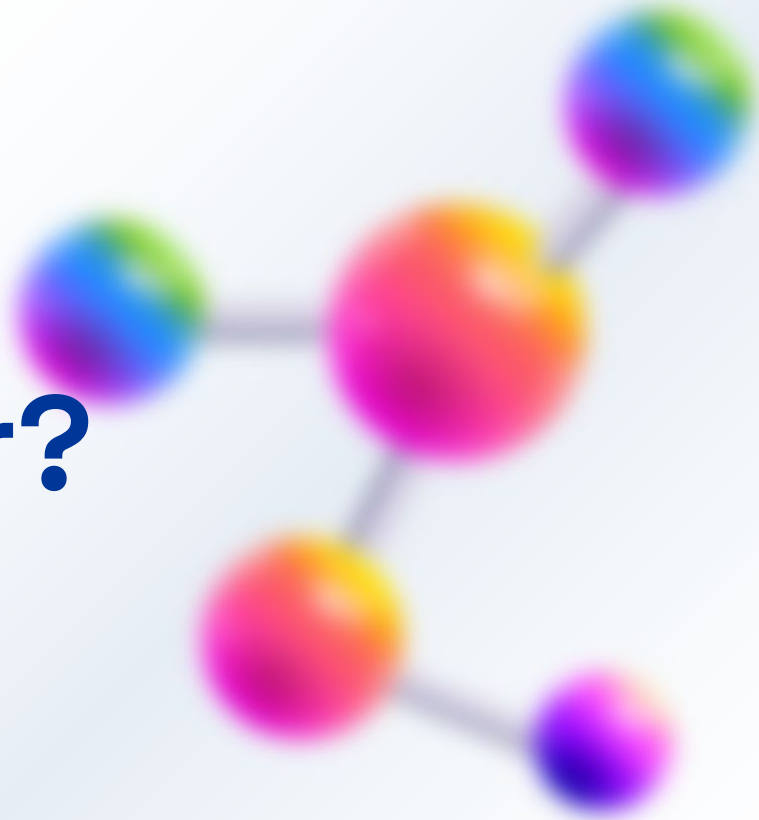
How did we get here?

A brief history of how mw model atoms.

01

What is matter?

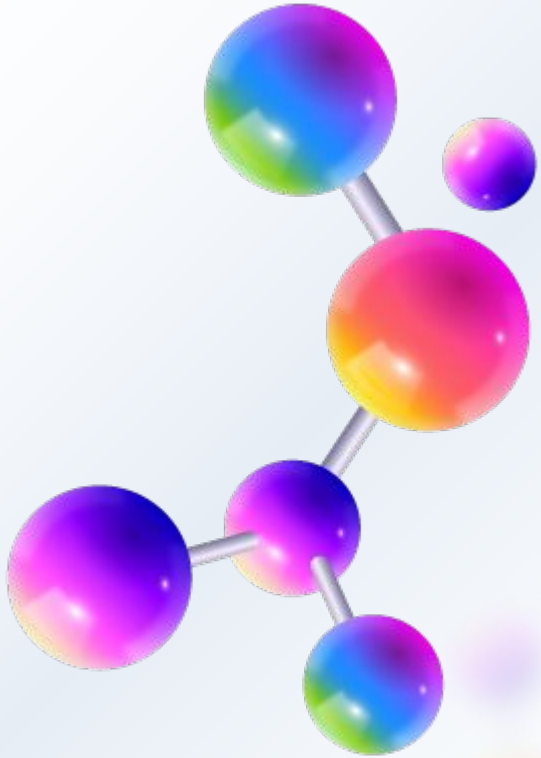
And why does it matter?



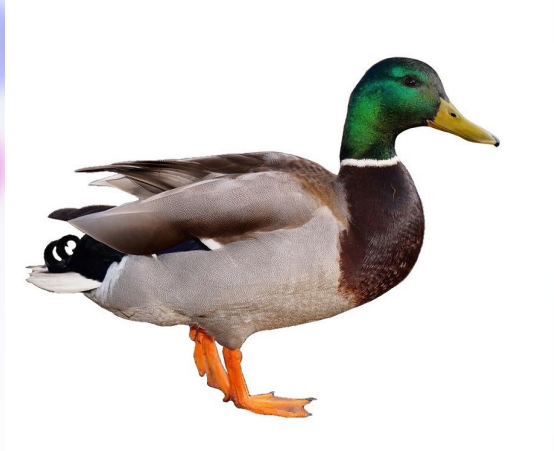
What is matter?

The term **matter** refers to anything that occupies space and has mass—in other words, the “stuff” that the universe is made of.

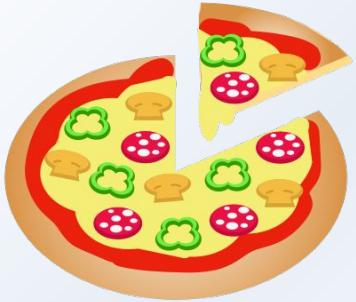
Matter includes all **living** and **nonliving** things.

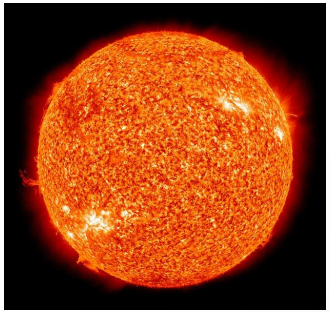


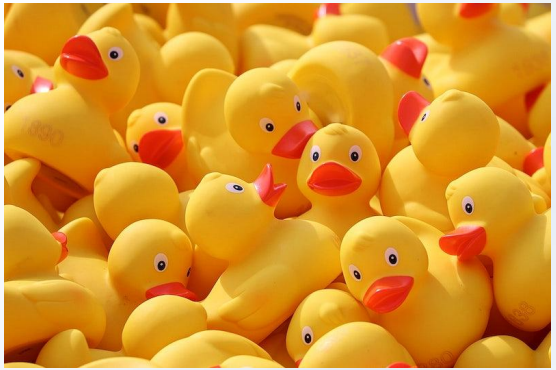
Is it matter?

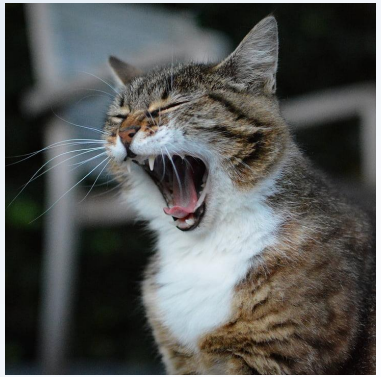








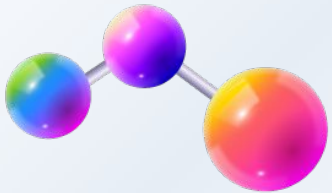




Keeping things organized: Matter

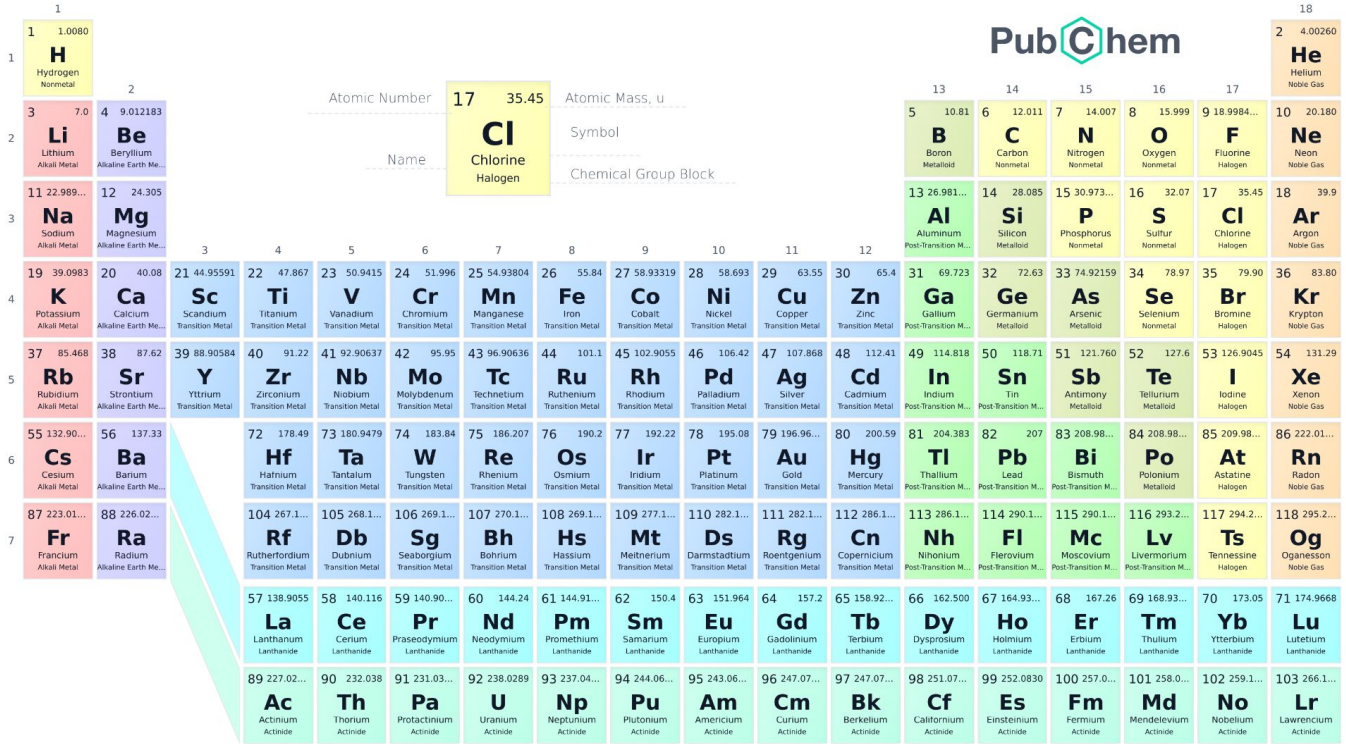
All matter is made up of substances called **elements**, which have specific chemical and physical properties and cannot be broken down into other substances through ordinary chemical reactions.

These elements help categorize matter because of their individual properties. **How do you think we might organize elements?**



PERIODIC TABLE OF ELEMENTS

Chemical Group Block



What we know so far:

- Matter is anything that takes up space and has mass.
- Elements are substances that make up matter that have specific individual properties.

Our next question:

- What are atoms?







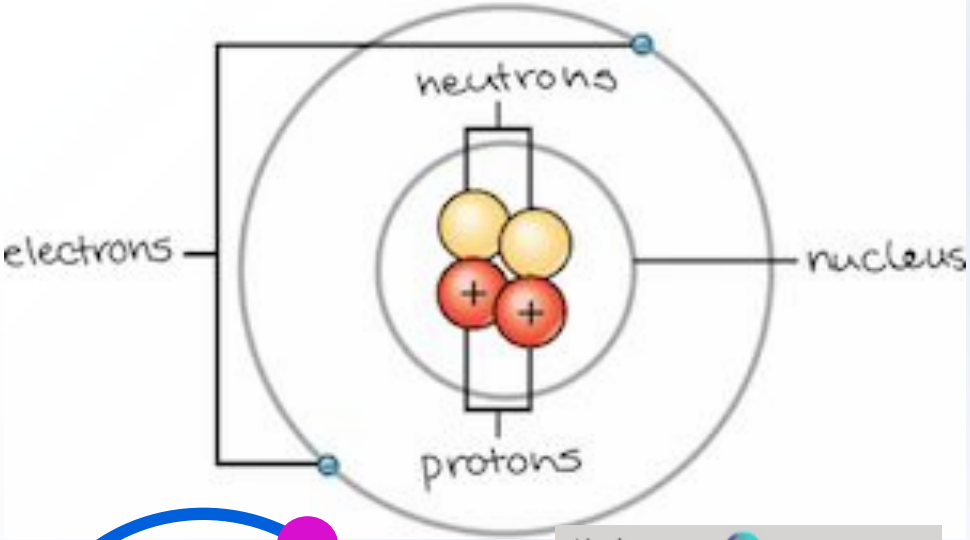
02

Atoms

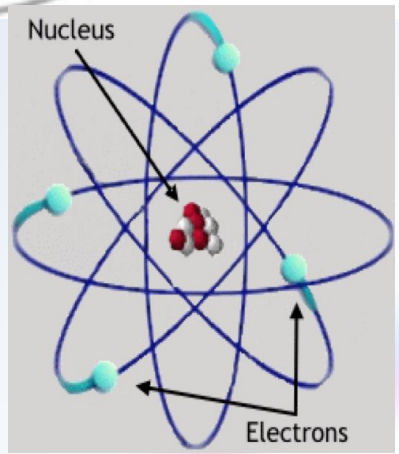
They make up everything.

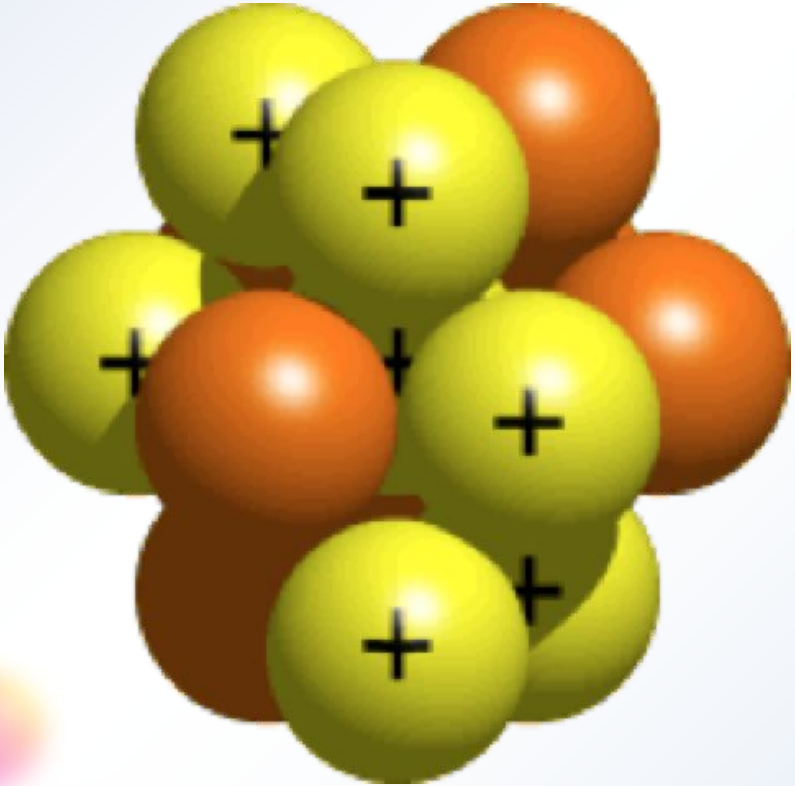
Atoms

- The smallest unit of an element that maintains the properties of that element.
- Consists of a central nucleus surrounded by one or more electrons.









Nucleus

- The central part of an atom.
- Composed of protons and neutrons.
- Contains most of an atom's mass.

Structure of an atom: Subatomic particles



Electron

Electrons are small, negatively charged particles that surround the nucleus.



Proton

Protons are larger than electrons, but are still very small. They make up the nucleus, along with neutrons.



Neutron

Neutrons are similar in mass to protons. They are uncharged particles in the nucleus.

Characteristics of the particles

Particle	Location	Mass	Charge
Neutron	Nucleus	1 atomic mass unit (AMU)	Neutral 0
Proton	Nucleus	1 atomic mass unit (AMU)	Positive +1
Electron	Electron cloud in energy levels	0 atomic mass unit (AMU)	Negative -1

What we know so far:

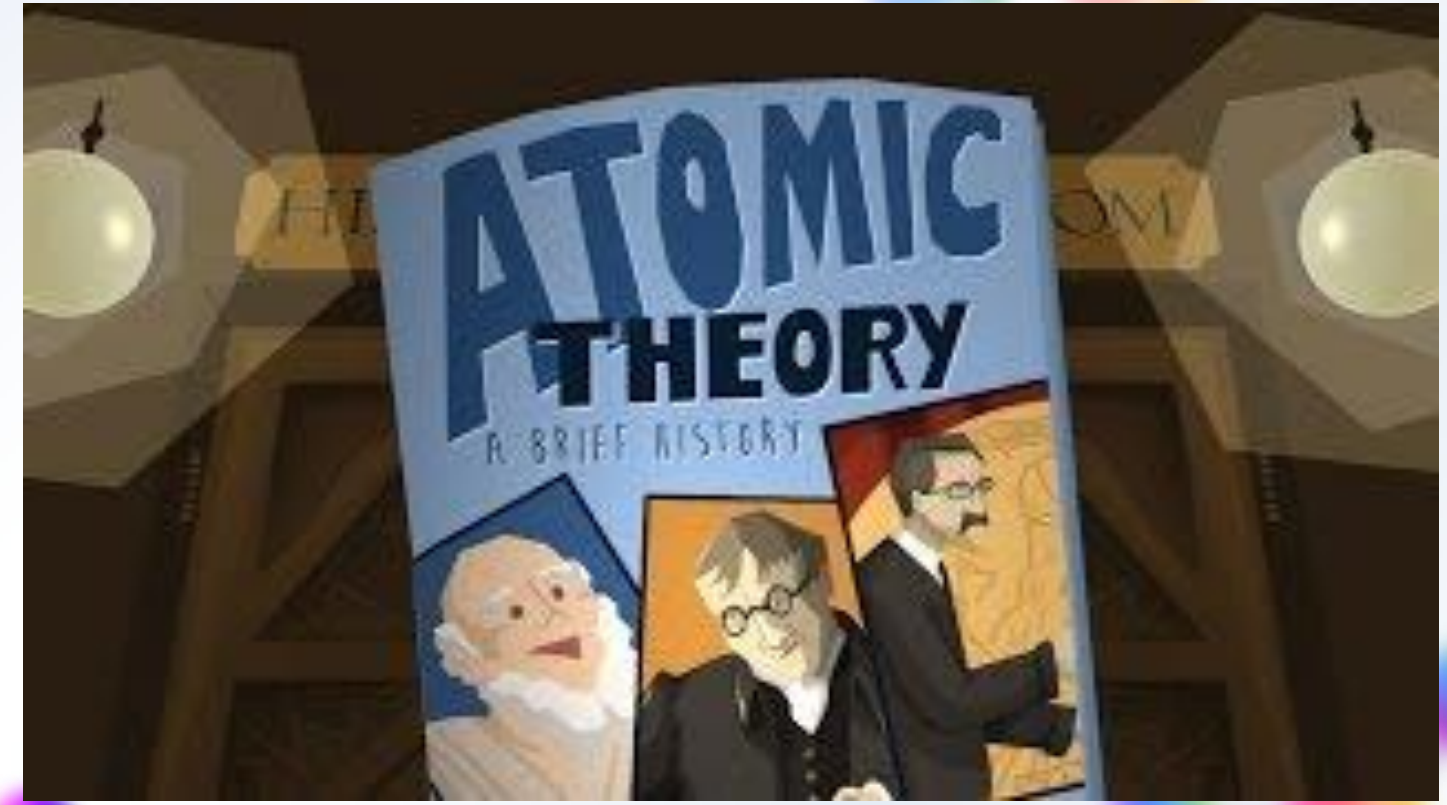
- Matter is anything that takes up space and has mass.
- Elements are substances that make up matter that have specific individual properties.
- Atoms are the smallest unit of an element that maintains the properties of that element.
- Atoms are made up of smaller particles called protons, neutrons, and electrons.

03

How did we get here?

A history of atoms in science.




ATOMIC
THEORY
A BRIEF HISTORY

Sources

- Khan Academy
- What is an Atom? Jefferson Lab Slides
- Periodic Table
- TED-Ed

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