

The Tiny Building Blocks

A Story About Atoms, Molecules, and Compounds

One afternoon, Maya and Arjun were sitting in science class.

Mrs. Patel placed a glass of water, an iron nail, and a piece of sugar on the table.

“What do these things have in common?” she asked.

“They’re all different!” Arjun said.

“Yes, but they are all made of **matter**,” Mrs. Patel explained.

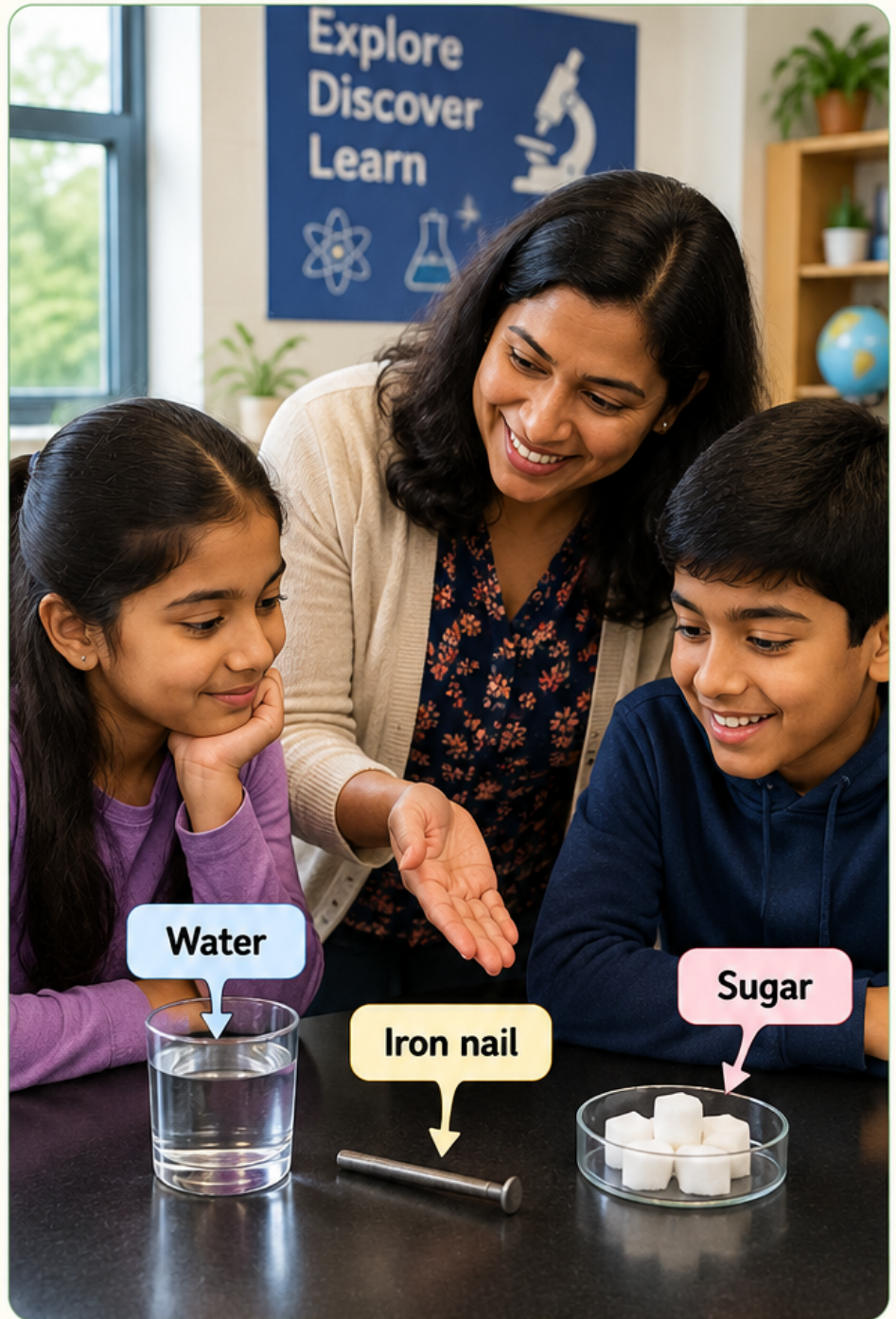
“Matter is anything that has mass and takes up space.”

Maya looked at the objects.

“But what is matter made of?”

“Tiny particles called atoms,” Mrs. Patel replied.

“Atoms are the building blocks of matter.”

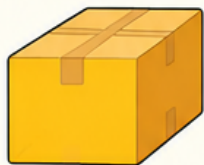


What Is Matter?

Matter is anything that has mass and takes up space.



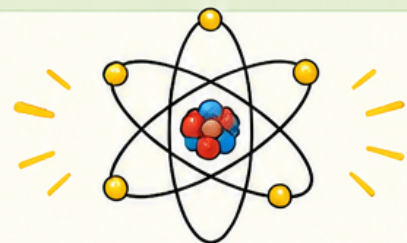
has mass



takes up space

Atoms

Atoms are tiny particles that make up all matter. They are the building blocks of matter.



Meet the Atom

Mrs. Patel showed them a picture of an atom.

“An **atom** is the smallest unit of an element that still has the properties of that element.”

“What is an element?” Maya asked.

“An element is a pure substance made of only one kind of atom.”

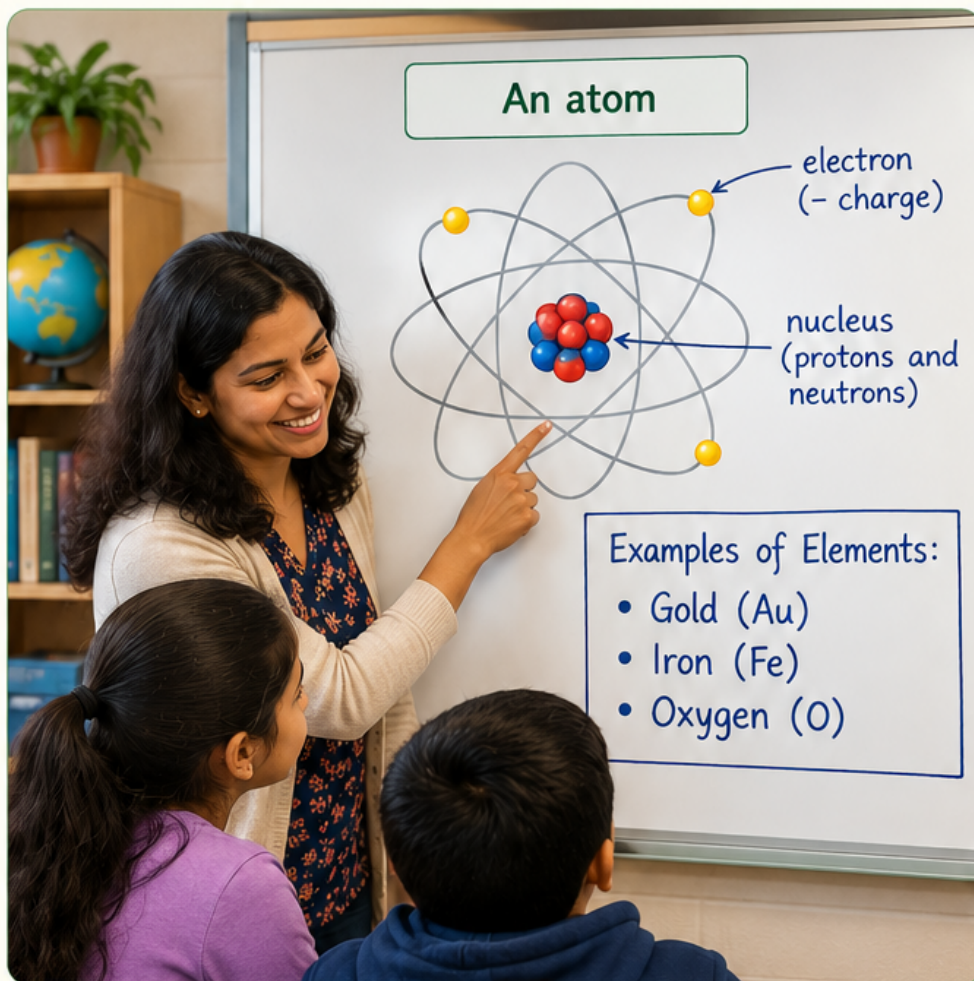
She wrote three examples on the board:

- Gold (Au)
- Iron (Fe)
- Oxygen (O)

“So gold contains only gold atoms?” Arjun asked.

“Exactly! Scientists have identified 118 elements.”

Maya smiled. “So different kinds of atoms make different elements!”



Key Ideas

Atom

The smallest unit of an element that still has the properties of that element.



Element

A pure substance made of only one kind of atom.



All the same atoms

Examples of Elements

Gold (Au)



Made of only gold atoms.

Iron (Fe)



Made of only iron atoms.

Oxygen (O)



Made of only oxygen atoms.

When Atoms Join Together

Mrs. Patel drew two hydrogen atoms joined together.

"Sometimes atoms bond together to form molecules."

"A molecule is made of two or more atoms chemically bonded together."

"Do they have to be different atoms?"
Maya asked.

"No. They can be atoms of the same element or different elements."

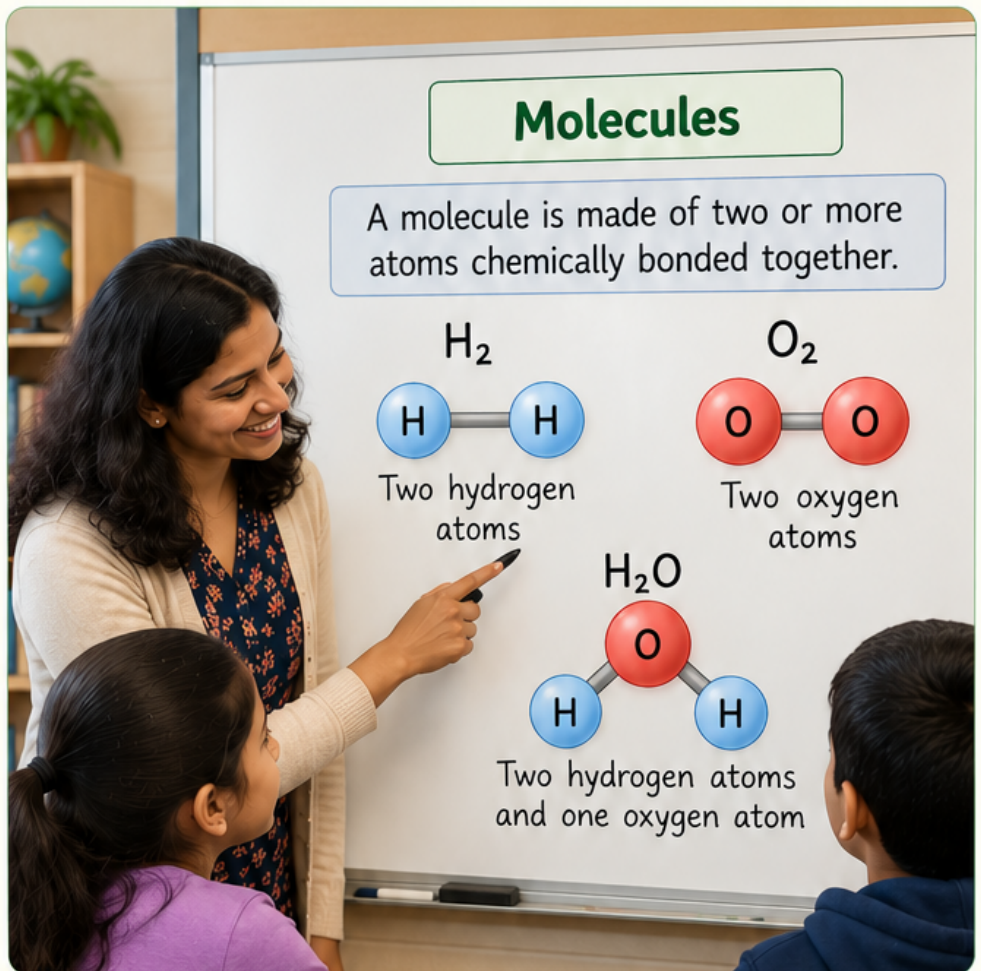
She wrote:

- H_2 = Two hydrogen atoms
- O_2 = Two oxygen atoms
- H_2O = Two hydrogen atoms and one oxygen atom

Arjun pointed to H_2O .

"That's water!"

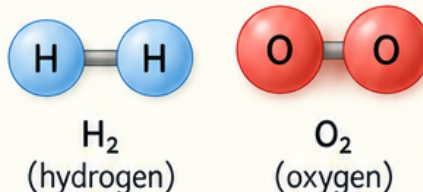
"Correct! Water is a molecule too."



Types of Molecules

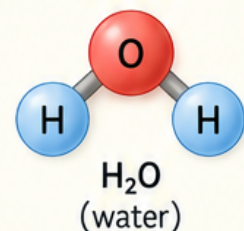
Molecules with the same kind of atoms

Made of atoms of one element.



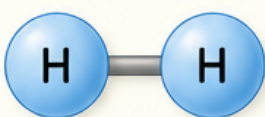
Molecules with different kinds of atoms

Made of atoms of different elements.



Examples of Molecules

H_2



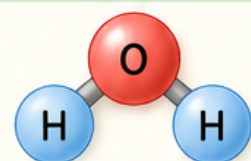
Two hydrogen atoms.
A molecule.

O_2



Two oxygen atoms.
A molecule.

H_2O



Two hydrogen atoms and
one oxygen atom.
A molecule.

What Makes a Compound?

Mrs. Patel drew a water molecule on the board.

“Now let’s learn about compounds.”

“A compound is a pure substance made of two or more different elements chemically combined in a fixed proportion.”

“So water is a compound because it contains hydrogen and oxygen?” Maya asked.

“Exactly!”

She showed them three examples:

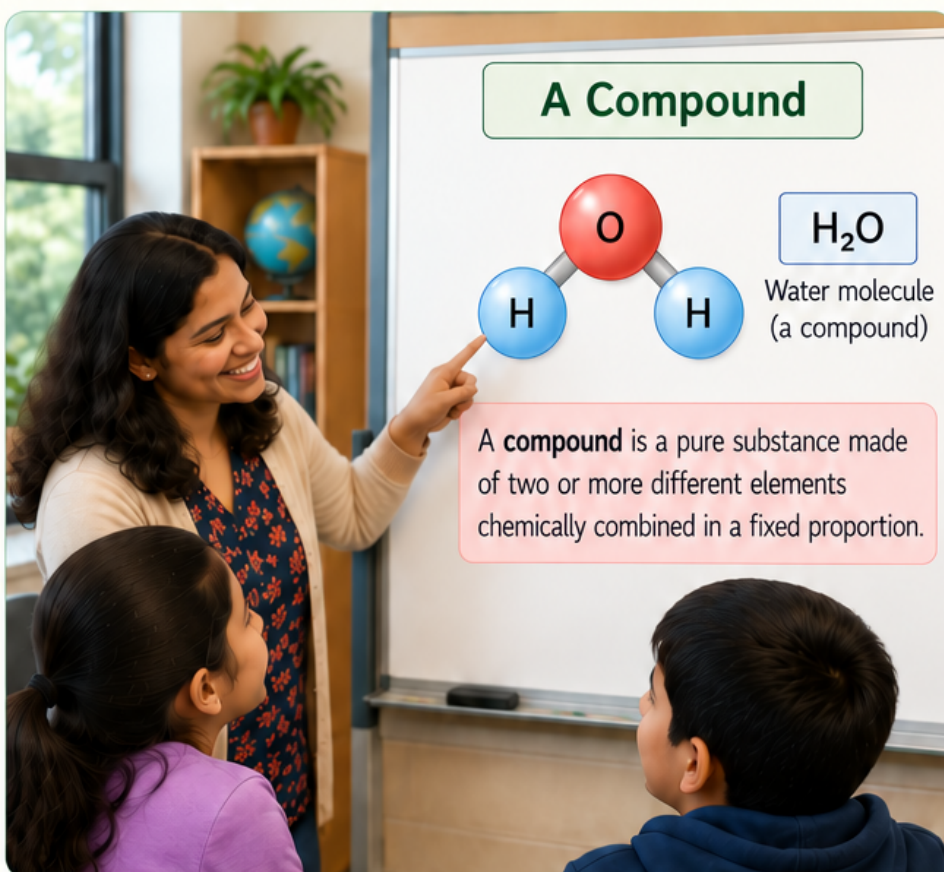
- **Water (H_2O)** — Hydrogen and oxygen
- **Carbon dioxide (CO_2)** — Carbon and oxygen
- **Salt (NaCl)** — Sodium and chlorine

“Is every molecule a compound?” Arjun asked.

“No! Oxygen gas (O_2) is a molecule, but not a compound because it contains only oxygen atoms.”

“And is every compound a molecule?” Maya asked.

“Not always. Table salt is a compound, but it forms a crystal of ions rather than separate molecules.”



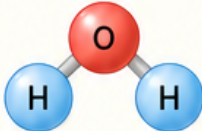
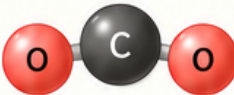
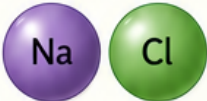
A Compound

H_2O

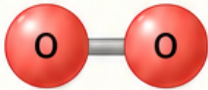
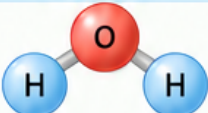
Water molecule (a compound)

A **compound** is a pure substance made of two or more different elements chemically combined in a fixed proportion.

Examples of Compounds

Water (H_2O)	Carbon dioxide (CO_2)	Salt (NaCl)
		
Hydrogen and oxygen	Carbon and oxygen	Sodium and chlorine

Molecules vs. Compounds

Molecule (not a compound)	Compound
	
O_2 (oxygen gas)	H_2O (water)
• A molecule made of two oxygen atoms (same element). • Not a compound.	• A molecule made of hydrogen and oxygen (different elements). • A compound.

Not All Compounds Are Molecules

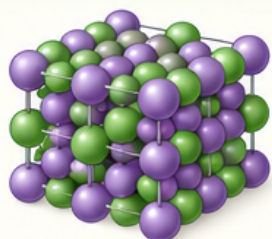


Table salt (NaCl)

- A compound made of sodium and chlorine.
- Forms a crystal of ions (not separate molecules).
- Still a compound, but not a molecule.

Key Idea!

A molecule can contain atoms of the same element, but a compound must contain at least two different elements.

Spot the Difference!

Mrs. Patel placed three drawings on the board.

“Let’s see if you remember!” she said.

“Is a single helium atom a molecule?”

“No,” Arjun replied. “It’s just one atom!”

“Is oxygen gas, O_2 , a molecule?”

“Yes!” Maya said. “Two oxygen atoms are bonded together.”

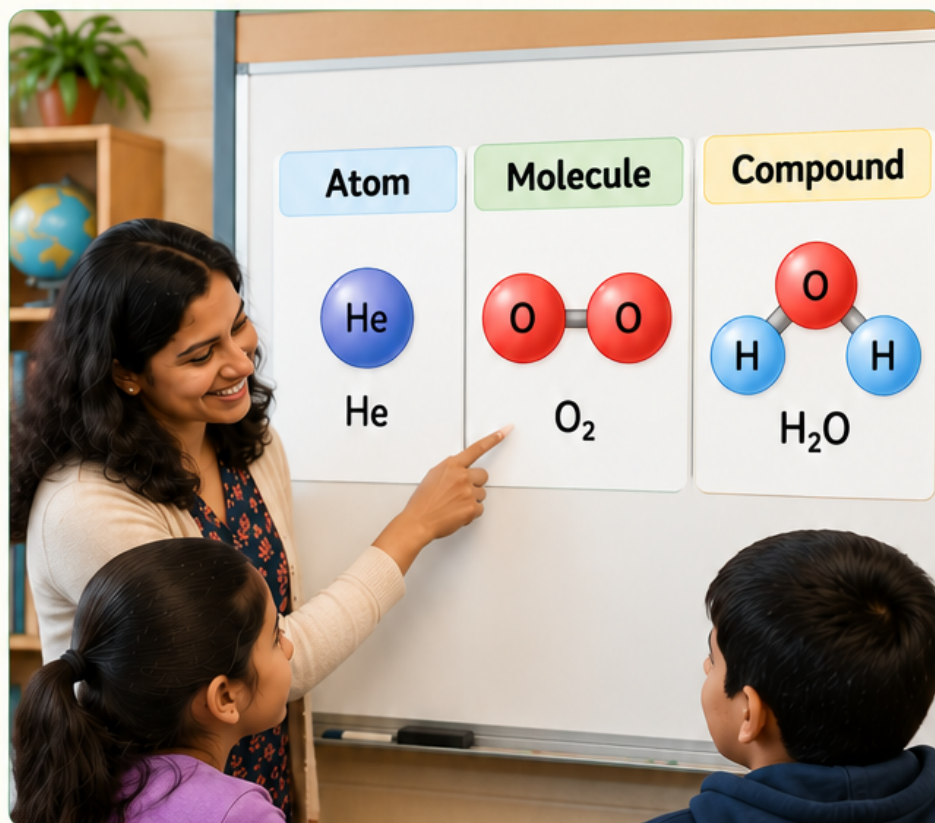
“Is it also a compound?”

“No, because it contains only one element.”

“What about water, H_2O ?” Mrs. Patel asked.

“It’s both a molecule and a compound!” Arjun answered.

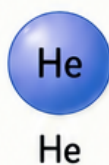
“Excellent!”



Key Differences

Atom

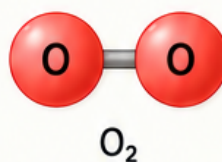
A single atom.



One atom of an element.

Molecule

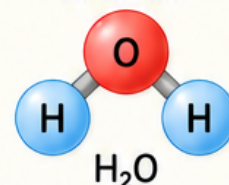
Two or more atoms chemically bonded.



Can be atoms of the same element or different elements.

Compound

Two or more different elements chemically combined.



Must contain at least two different elements.

Let's Check!

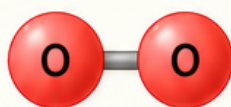
1 Is a single helium atom a molecule?



No.

It's just one atom!

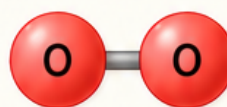
2 Is O_2 a molecule?



Yes!

Two oxygen atoms are bonded together.

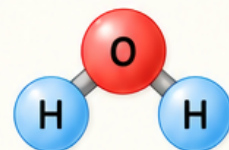
3 Is O_2 a compound?



No.

It contains only one element.

4 What about H_2O ?



It's both
a molecule and
a **compound!**

The Building Blocks of Our World

At the end of class, Maya looked at her water bottle.

“So everything around us is made of atoms?”

“Yes,” Mrs. Patel said.

“Atoms can join together in different ways to make the many substances around us.”

Arjun picked up his pencil.

“Even this pencil?”

“Of course!”

Maya smiled.

“Atoms are tiny, but they make up our enormous world!”

Mrs. Patel nodded.

“And understanding how atoms combine helps scientists understand matter.”



Water

Made of atoms joined together in a molecule (H_2O).



Pencil

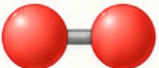
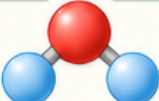
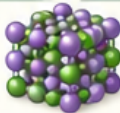
Made of many atoms different elements (like carbon).



Everything Around Us

All matter is made of atoms!

Science Element — Remember!

Term	Meaning	Example
Atom	Smallest unit of an element	 He
Element	Pure substance containing one kind of atom	 Gold (Au)
Molecule	Two or more atoms chemically bonded	 O_2 , H_2O 
Compound	Two or more different elements chemically combined	  H_2O , NaCl



Key difference: A molecule can contain atoms to the some element, but a compound must contain at least two different elements.