

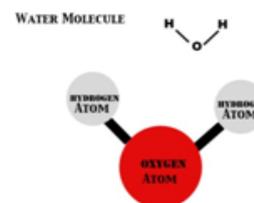
# What Is a Molecule?

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## Atoms and Molecules

An atom is the fundamental unit of matter. Atoms of most of the elements are not stable and therefore they are unable to exist independently. These atoms either form ions or combine with the same or other elements to attain a stable state. [Molecules](#) are the smallest particles of an element or compound which has the same properties as that of the substance.

They are self-sufficient to exist in a free state. A molecule is said to be formed when two or more than two similar or dissimilar atoms are held together by chemical bond. A [chemical bond](#) is formed by an exchange of electrons or by sharing of electrons between the atoms.



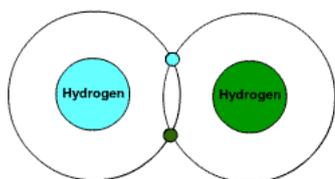
For example, a single drop of water contains millions and billions of water molecules in it.

[Water molecule](#) forms when two atoms of hydrogen and one atom of oxygen join together in sharing their electrons.

## Types of molecules

Molecules are classified into two categories:

1. Molecule of an element
2. Molecule of compound



### Molecules of element

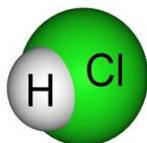
The molecules of an element are formed by the same type of atoms.

The number of atoms forming a molecule of an [element](#) is known as its atomicity.

On the basis of atomicity, molecules are divided into

- **Monoatomic molecules:** when a molecule of element is made up of single atom, it is said to be monoatomic molecule. E.g., Helium, neon
- **Diatomic molecules:** diatomic molecule is made up of two same atoms. E.g. - $H_2$  and  $N_2$
- **Triatomic molecules:** triatomic molecule is made up of three atoms. E.g.,  $O_3$  contains three atoms of oxygen.
- **Tetratomic molecules:** these molecules contain four atoms. E.g.,  $P_4$  contain four atoms of phosphorus.
- **Polyatomic molecules:** Molecules containing more than four atoms are polyatomic molecule. E.g.,  $S_8$  is a [sulphur](#) molecule containing eight atoms of sulfur

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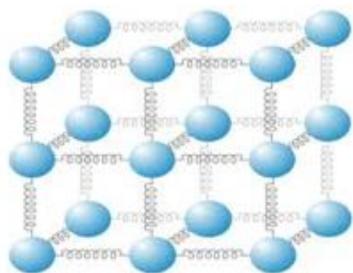


## Molecules of a compound

A compound is said to be formed when two or more [atoms](#) of different elements combined together in a fixed proportion.

Example: Hydrogen chloride molecule (HCl) contains two different types of atoms, hydrogen and chlorine atom.

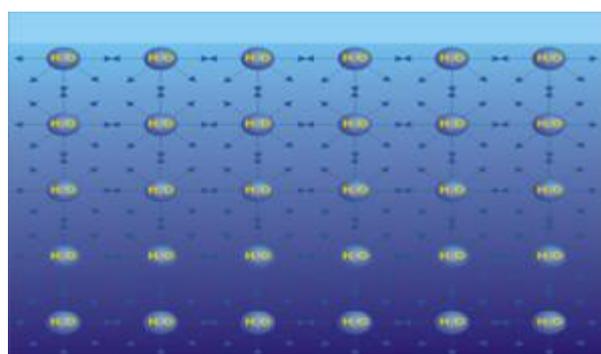
## Arrangement of molecules in Solid, Liquid, and Gases



### Arrangement of molecules in solid

Atoms of [solids](#) are tightly held together by a strong force so they cannot move from their places. They keep the molecules in fixed spatial arrangement.

The particles of solid are vibrating in their own place so they cannot move from their position. Because of these properties solids cannot be compressed and maintain their own shape. As the particles of solids are strongly held together by strong forces, it is not possible to pass through them.



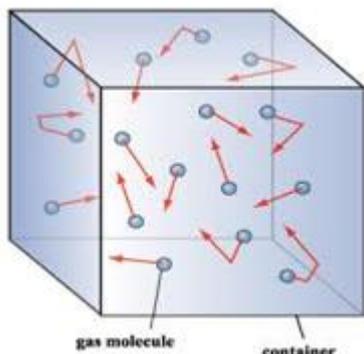
### Arrangement of molecules in liquid

In [liquid](#) state, the intermolecular attractions keep the molecules in proximity. The particles are close together but not touching each other. The particles are arranged randomly and are roaming about in all directions.

The forces holding the particles are weaker than solids but stronger than gases. As the particles are moving randomly in all

the directions and changing their places all the time, they do not keep their own shape.

They acquire the shape of the container in which they are kept. The particles of liquid are close together so they cannot be compressed.



### Arrangement of molecules in gas

In [gaseous](#) states, the molecules are apart from each other and have minimal intermolecular attractions between them.

They are moving very rapidly in different directions and are not arranged in specific pattern.

As they are so small and have negligible forces between them they can be easily compressed and flow in any direction.

### Why are gases easily compressible?

Try to answer. Still need help? Want to know more about molecules? [Click here](#) to schedule live help from a certified tutor!

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### Reference Links:

- <http://en.wikipedia.org/wiki/Molecule>
- <http://www.kibron.com/fileadmin/pictures/water.png>
- [http://www.hk-hy.org/contextual/heat/tep/trans/solid\\_state\\_model.gif](http://www.hk-hy.org/contextual/heat/tep/trans/solid_state_model.gif)
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