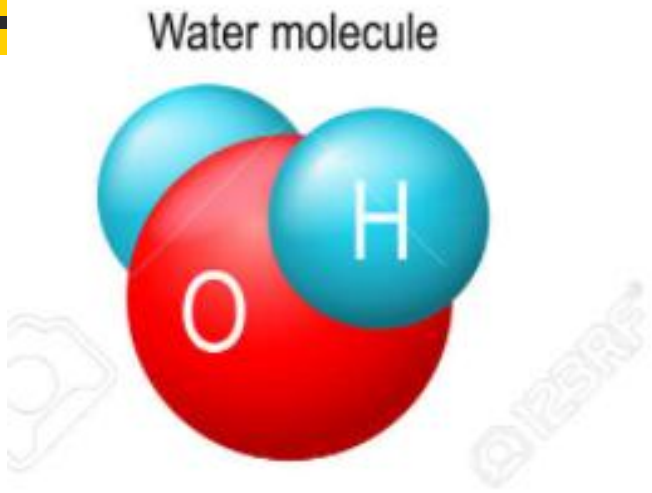
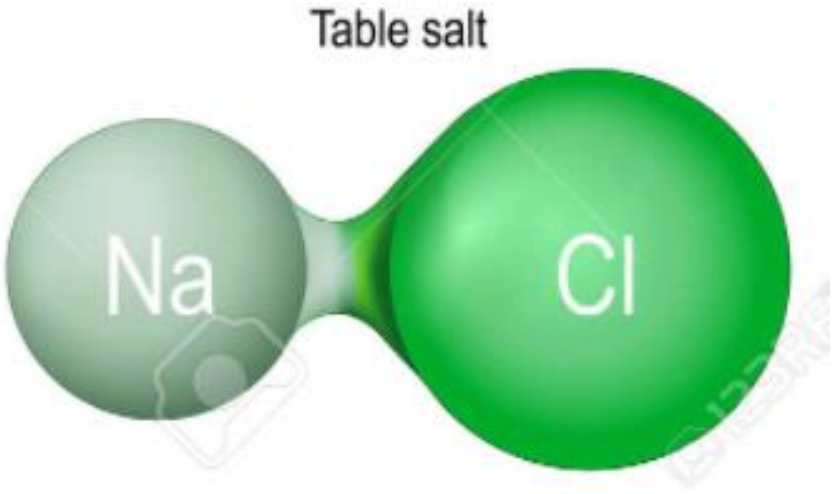
Learning Objectives

- To understand the bonding that occurs in molecular compounds
- To compare and contrast ionic and molecular compounds

Molecular Compounds

Which compound below is molecular? Which is ionic?

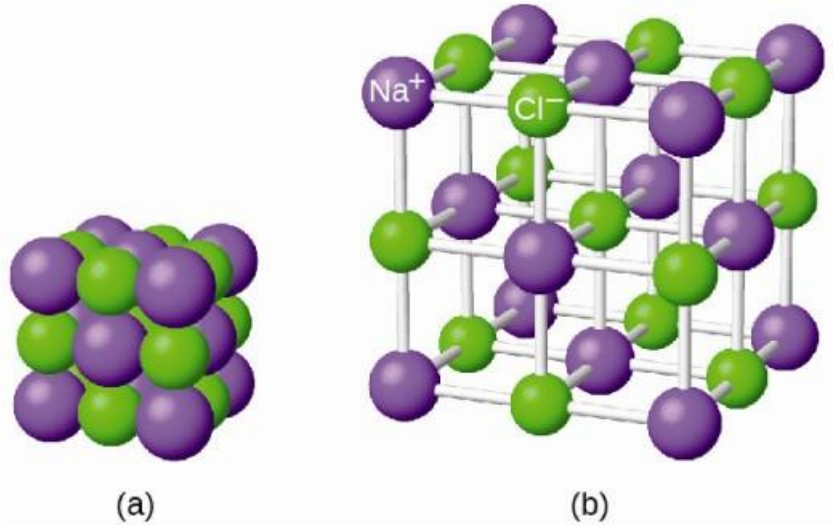




What are molecular compounds?

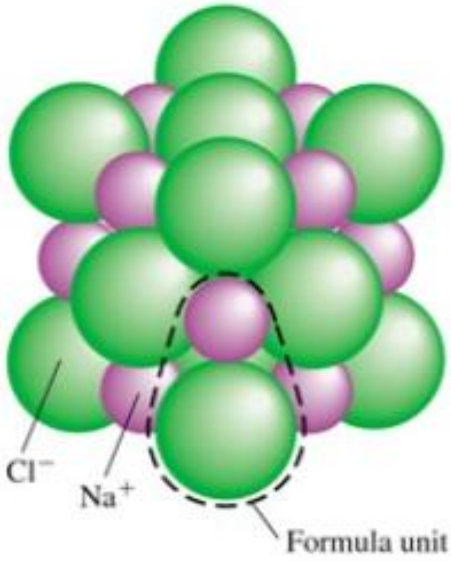
- Compounds made up of individual particles called **molecules**

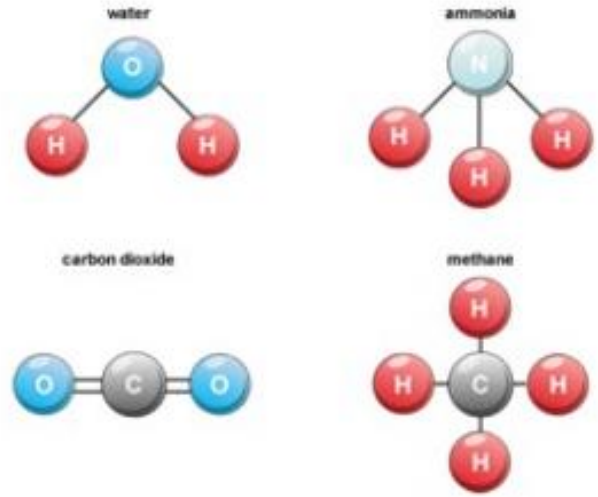
- *Remember: ionic compounds are made up of metal and non-metal ions in a crystal form*



What are they?

- Elements in molecular compounds are **all non-metals**
- There are **no ions** in molecular compounds





How are they recognized?

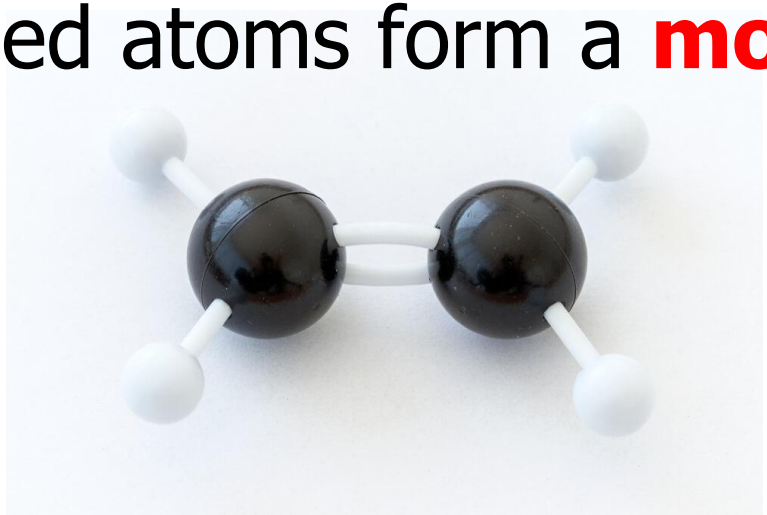
- All compounds that are **gases** or **liquids** at **room temperature** are molecular compounds
- Solid compounds **may** be molecular as well
- **Most** of the **chemicals** we see and use every day are **molecular**

What are their properties?

- Forces of attraction (**bonds**) between atoms in a molecular compound are **weak**
- Therefore, **melting point is low** because little energy is required to break the forces of attraction
- **Non-conductive** because there are no ions
- **Non-electrolytes**

How and why are they formed?

- Formed when atoms **share** electrons in order to have a stable octet in outer orbit
- This sharing of electrons forms a **covalent** bond
- The bonded atoms form a **molecule**



Special Molecules: Diatomics

- A diatomic molecule consists of only **two** atoms joined with a covalent bond
- There are **seven** common diatomics made up of identical elements
- H_2 O_2 F_2 Br_2 I_2 N_2 Cl_2
- Remember as **HOFBrINCl**

Meet Mr. HOFBrINCl

Or another one!

Have
No
Fear
Of
Ice
Co**l**d
Beve**r**ages

How does electron sharing work?

- Example: Hydrogen gas, H_2

How does electron sharing work?

- Example: Oxygen gas, O_2

How does electron sharing work?

- Example: Nitrogen gas, N_2

How does electron sharing work?

- Example: water, H_2O

How does electron sharing work?

- Example: Hydrogen chloride, HCl

How does electron sharing work?

- Example: Carbon dioxide, CO_2

Naming Molecular Compounds

- As with ionic compounds, the name ends with '**ide**'
- The name begins with the element to the **left** on the periodic table
- Prefixes are used to identify the **number** of atoms of an element that are present
- Prefixes can be used for both **first** and **subsequent** elements in a compound

Naming Molecular Compounds

Prefix	# atoms	Example
Mon(o)-	1	Carbon monoxide, CO
di-	2	Carbon dioxide, CO_2
tri-	3	Sulfur trioxide, SO_3
tetra-	4	Carbon tetrachloride, CCl_4
penta-	5	Phosphorus pentafluoride, PF_5

Naming Molecular Compounds

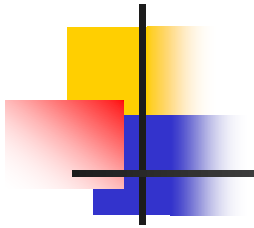
- Mono is **not** used for the first element in a compound
- The ‘o’ in mono is dropped when used with oxygen

- **Example:** What is the name of the compound CS_2?
- Step 1: write the names of all elements in the compound, changing the suffix of the last element to ide:

  carbon sulfide
- Step 2: add prefixes as necessary

  carbon disulfide

The name of the compound CS_2 is carbon disulfide



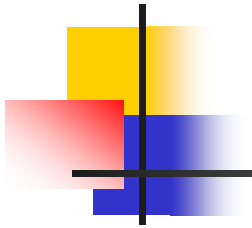
- What is the name of the compound with the chemical formula N_2O?

- dinitrogen monoxide

Chemical formulas for molecular compounds

- Very Easy!
- **Prefixes** in the name **become subscripts** in the formula
- For example: what is the chemical formula for the compound phosphorus pentachloride?

- PCl_5



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1a, 2, 3, 6, 9, 10

- worksheet