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|  | **Science 9**  **Chemistry IV** |  | **Name:**  **Date: Block:** |

1. **Ionic Compounds**
2. **Covalent Compounds**

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| **Ionic Compounds** |

Ionic compound: a compound made up of \_\_\_\_\_\_\_\_\_\_\_\_ charged \_\_\_\_\_\_\_\_\_\_ (positive ion + negative ion).

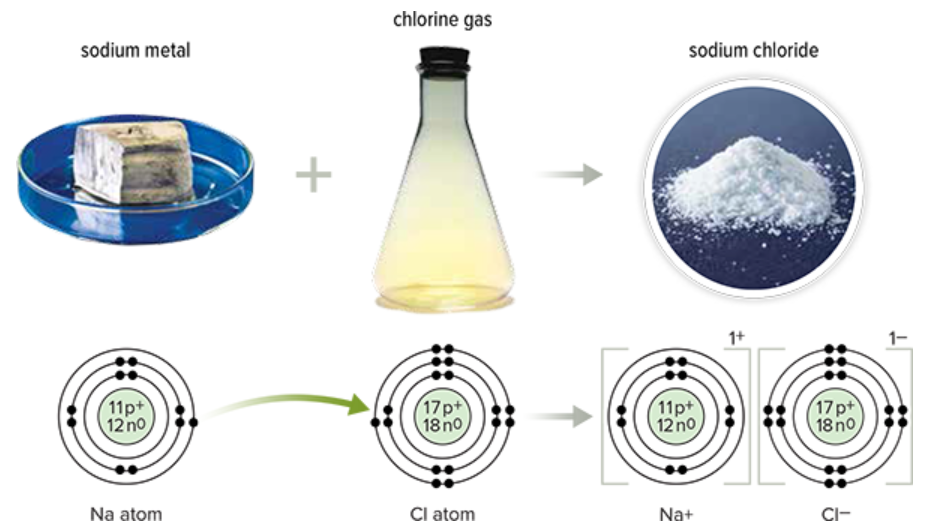
* They are made up of two types of elements: a \_\_\_\_\_\_\_\_\_\_\_\_ and a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + Ionic compounds that contain just two elements are called binary ionic compounds.
* Ions are held together by forming \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_. These bonds are very \_\_\_\_\_\_\_\_\_\_\_\_.

How do ionic compounds form?

* Atoms of the \_\_\_\_\_\_\_\_\_\_\_\_ element will \_\_\_\_\_\_\_\_\_\_\_\_ one or more \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_ the electrons to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ atoms.
* The amount of electrons that elements can gain or lose depends on the element’s \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_.
* Elements will want to gain/lose their electrons in order to achieve \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ shells. The stability of a full valence shell is what drives the formation of compounds.

For example: Sodium Chloride

* Sodium atoms (the metal) will transfer one electron to the chlorine atoms (the non-metal).
  + Sodium will become \_\_\_\_\_\_\_\_\_\_\_\_ charged (because it is losing one electron): Na+
  + Chlorine will become \_\_\_\_\_\_\_\_\_\_\_\_ charged (because it is gaining one electron): Cl-



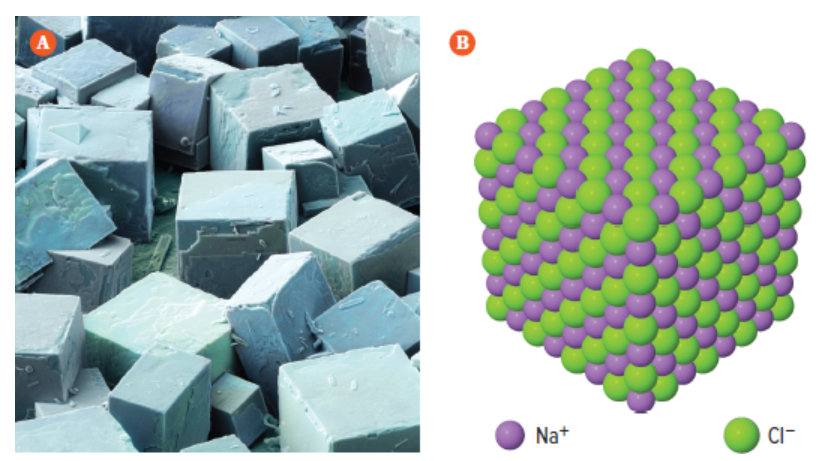
Examples:

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| Magnesium Fluoride (MgF2) |  |
| Lithium Oxide (Li2­O) |  |

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| **The Structure of Ionic Compounds** |

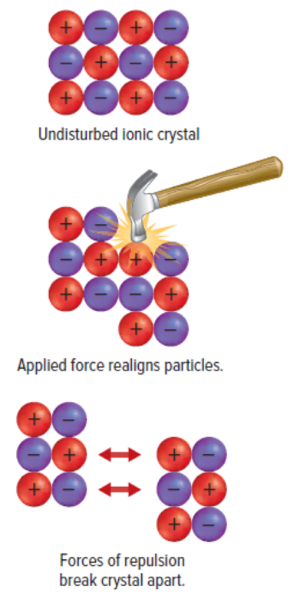
Ionic compounds are arranged in \_\_\_\_\_\_\_\_\_\_\_\_.

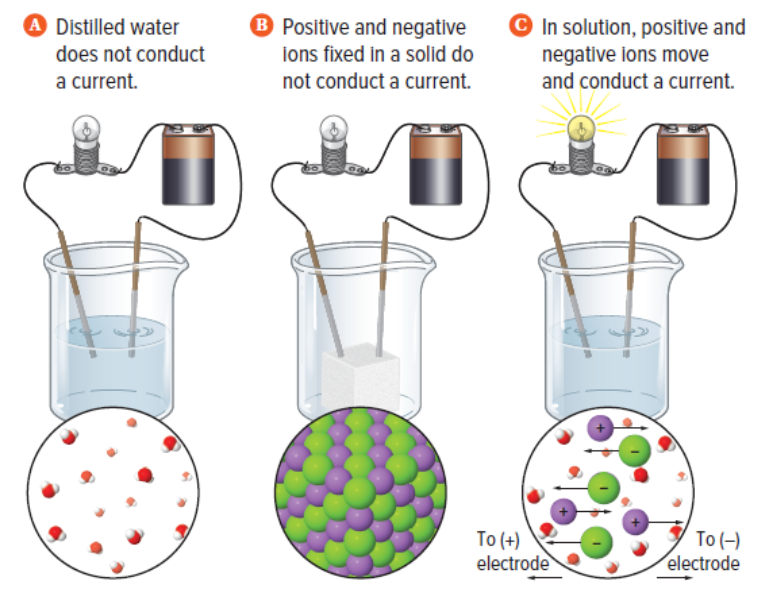
* A lattice occurs when the positive and negative ions are arranged in regular \_\_\_\_\_\_\_\_\_\_\_\_ patterns.



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| **Properties of Ionic Compounds** |

Common properties of ionic compounds:

* \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_
  + In order to melt an ionic compound, the strong ionic bond between the ions have to be broken.
  + As the bonds between the ions are very strong, it takes a lot of energy to break them. This results in ionic compounds needing very high temperatures in order to be melted.
* \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_
  + Due to the strength of the ionic bonds, ionic solids are very hard.
  + If enough force is applied, the ions will shift out of alignment from their lattice structure. This causes ions of the same charge to be close together and will result in the ions repelling each other.
* \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ of electricity when \_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_
  + Ionic compounds are NOT good conductors when they are in the solid state.
  + If ionic compounds are dissolved in water, they are good conductors. In this form, the ions in the compound are free to move around and conduct electricity.



**Practice:** Drawing Bohr Models of Ionic Compounds

**Before Bonding:**

|  |  |  |
| --- | --- | --- |
| Li Cl | Mg O | Mg Cl2 |

**After Bonding:**

|  |  |  |
| --- | --- | --- |
| LiCl | MgO | MgCl2 |

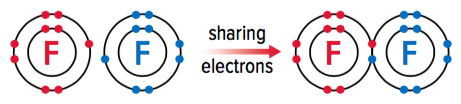
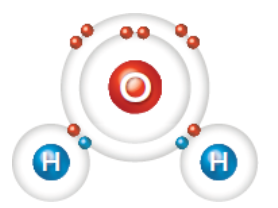
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| **Covalent Compounds** |

Covalent compounds: a compound that forms when two or more elements \_\_\_\_\_\_\_\_\_\_\_\_ electrons.

* They are made up of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* These elements are held together by forming \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_. These bonds are very \_\_\_\_\_\_\_\_\_\_\_\_.
* Covalent compounds are also known as \_\_\_\_\_\_\_\_\_\_\_\_. A molecule is a particle made up of 2 or more neutral atoms bonded together by covalent bonds.

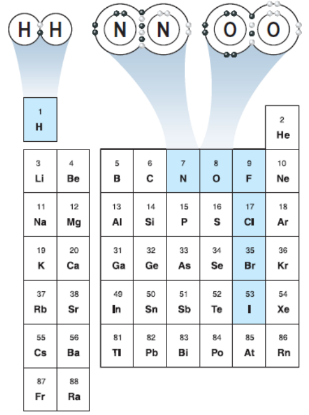
How do covalent compounds form?

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in covalent compounds achieve a full valence shell by \_\_\_\_\_\_\_\_\_\_\_\_ electrons. The stability of a full valence shell is what drives the formation of compounds.
* A covalent bond is a result of a \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_.



Examples:

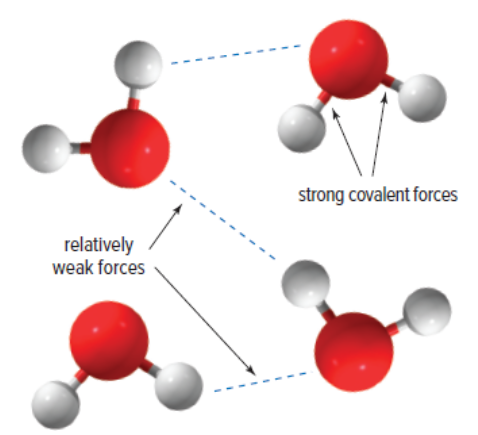
|  |  |
| --- | --- |
| Hydrogen gas (H2) |  |
| Methane (CH4) |  |



Covalent bonds can also occur between individual elements. These elements are called diatomic molecules.

* Elements that form diatomic molecules: \_\_\_\_\_\_,\_\_\_\_\_\_, \_\_\_\_\_\_,\_\_\_\_\_\_,\_\_\_\_\_\_,\_\_\_\_\_\_,\_\_\_\_\_\_.

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| **Properties of Covalent Compounds** |

Common properties of covalent compounds:

* Have \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_
  + The forces that hold atoms together in molecules are very strong (strong covalent bonds). However, the \_\_\_\_\_\_\_\_\_\_\_\_ that \_\_\_\_\_\_\_\_\_\_\_\_ one \_\_\_\_\_\_\_\_\_\_\_\_ to another are relatively \_\_\_\_\_\_\_\_\_\_\_\_.
  + When melting covalent compounds, you only need to provide enough energy to break the bonds between molecules. As the bonds between molecules are weak, most covalent compounds boil and/or melt at low temperatures.
* Are relatively \_\_\_\_\_\_\_\_\_\_\_\_
  + The forces between molecules are weak. Due to this, it is easier for molecules to shift and move relative to one another.
* Are \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_
  + Covalent compounds do not have free electrons or ions (they \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ form ions). Due to this, they are not good conductors of heat and electricity.

**Practice:** Drawing Bohr Models of Covalent Compounds

**Before Bonding:**

|  |  |
| --- | --- |
| H2 O | O F2 |

**After Bonding:**

|  |  |
| --- | --- |
| H2O | OF2 |