

Grade 10 Chemistry Review

Mrs. Kornelsen

Why should we learn about Chemistry?

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Lab safety

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Summary

For any neutral element:

- ⦿ Number of Protons = Atomic Number
- ⦿ Number of Electrons = Number of Protons
- ⦿ Number of Neutrons = Rounded Atomic Mass - Protons

Periods

The **first period** is the first row of the periodic table.

- These atoms have only one shell.
- It holds only 2 electrons.

Periods

- ⦿ The **second period** of the periodic table is the second row.
 - These atoms have 2 shells.
 - The first shell holds 2 electrons and the second shell holds 8 electrons.

Periods

- ⦿ The **third period** of the periodic table is the third row.
 - These atoms have 3 shells.
 - The first shell holds 2 electrons, the second shell holds 8 electrons, and the third shell holds 8 electrons.

Chemical Families

- ⦿ The periodic table is organized into families.
- ⦿ Each family is a column on the periodic table.
- ⦿ Chemical Families share similar properties.
- ⦿ Looking at the Bohr diagrams of the atoms how are all the elements in a family similar?

Valence Electrons

- ⦿ They all have the same number of electrons in their outer shell.
- ⦿ These are called **valence electrons**.
- ⦿ It is the valence electrons that give atoms their characteristics and properties.
 - Reactivity
 - Stability

Chemical Families

1. Alkali Metals (Group 1A)
2. Alkali Earth Metals (Group 2A)
3. Chalcogens (Group 6A)
4. Halogens (Group 7A)
5. Noble/Inert Gases (Group 8A)
6. Hydrogen
 - Could be in two different columns or families so it gets its own.

The Big Goal...

The key to family stability or reactivity is how easy it is to get a **full valence shell**.

- ⦿ Either **lose electrons**
- ⦿ Or **gain electrons**

Atoms want to gain or lose electrons to reach a full valence shell.

2 electrons in period 1

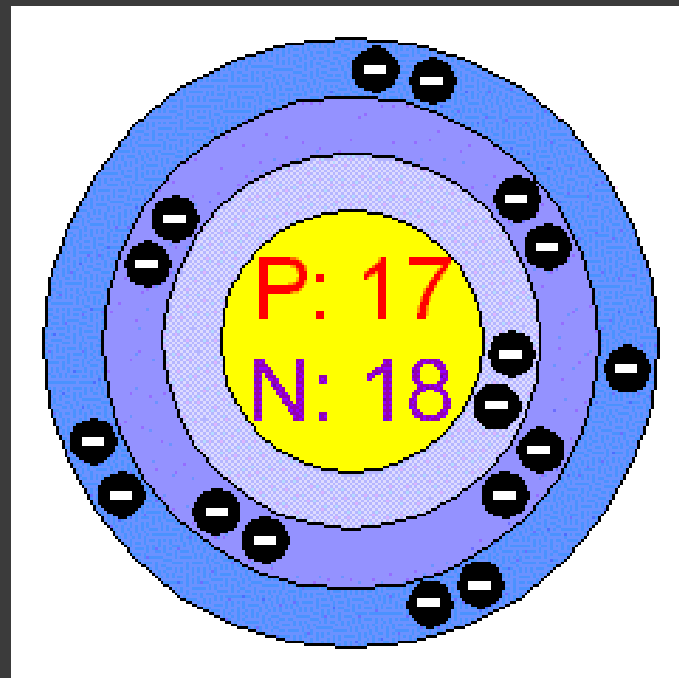
8 electrons in period 2 & 3

Lewis Dot Diagrams

- Lewis Dot Diagrams are an easier way to depict valence atoms and ions because you only need to draw the valence electrons of an atom.
- From now on when you are asked to draw Bohr diagrams you can choose to use Lewis dot instead.

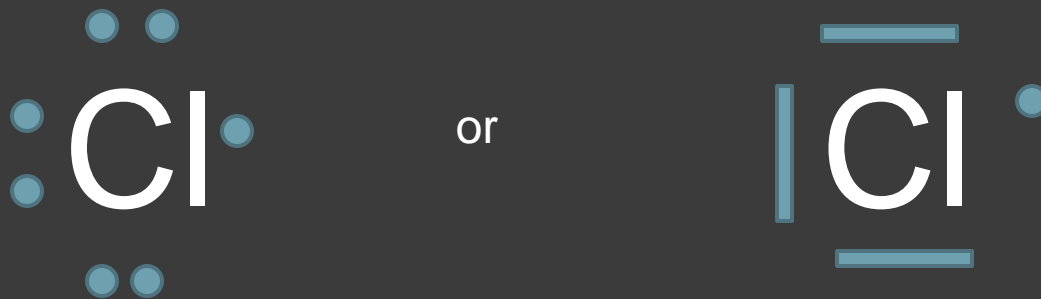
Lewis Dot Diagrams

- Draw the Bohr diagram for Chlorine.....



Lewis Dot Diagrams

- Now draw the Lewis Dot Diagram ... Easier, eh?



Lewis Dot of Ion

- If it gains electrons, draw the full valence shell around the chemical symbol in square brackets with the charge in the upper right corner.

Lewis Dot of Ion

- If the element loses electrons, draw the chemical symbol with an empty valence shell with the charge in the upper right corner.

- ⦿ Ion – A charged atom
- ⦿ Cation – a **positively** charged particle (**loses** electrons)
 - Cats have paws 😊/ t looks like +
- ⦿ Anion – a **negatively** charged particle (**gains** electrons)

FORMING COMPOUNDS

Atoms gain, lose, or share electrons to obtain full valence shells and become **stable**.

These atoms that have gained or lost electrons are called **ions**.

Where do the atoms get these extra electrons?

They form chemical bonds with other atoms.

The number of electrons present remains the same, but their arrangement changes when compounds form.

Metal atoms tend to lose electrons, while non-metal atoms tend to gain or share electrons.

Members of the noble gas family are chemically stable they do not react.

Ionic Bonds

Bonds between a **metal** and a **non-metal**

- between the left side of the periodic table and the right side

Ionic bonds result when electrons are transferred from metal atoms to non-metal atoms.

The metal atoms **lose** electrons to become **positive** ions, while the non-metal atoms **gain** electrons to become **negative** ions. The ions are held together by the attraction of opposite charges in an ionic bond.

Examples

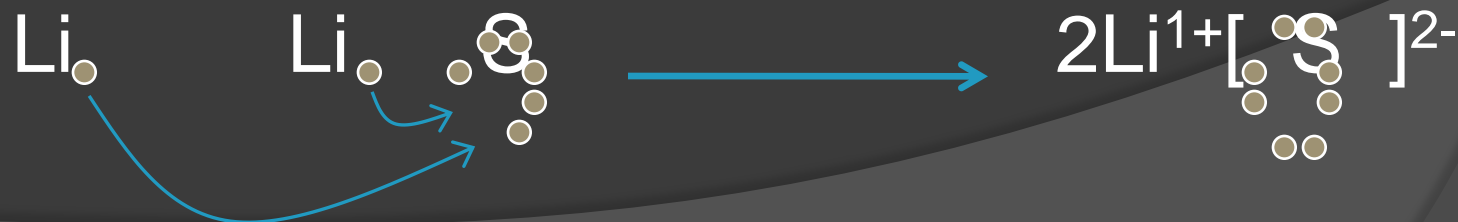
1. Na and Cl



2. Mg and F



3. Li and S



Characteristics of Ionic Compounds

1. They have relatively **high** melting points.
 - the bond is strong because they are held together by the attraction of opposite charges
2. When melted or dissolved in water they conduct electricity. (An **electrolyte**)
3. They **do not** conduct electricity when solid.

Covalent Bonds

(bonds between two **non-metals**)

Covalent bonds result when non-metals **share** electrons.

By overlapping their valence shells, the atoms share pairs of electrons.

This increases the number of electrons in each atom's valence shell, so that the atoms appear to have full shells.

Examples

1. Cl and Cl



****No Ions****

Aside: This is called a **diatomic** molecule. When two identical atoms combine. There are a few elements on the periodic table that always come in this form. (Remember the clown??) The diatomic elements on the periodic table are:

H

O

F

Br

I

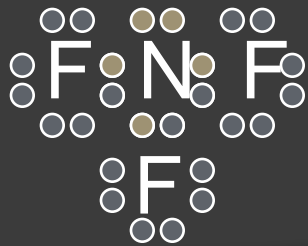
N

Cl

2. H and O



3. N and F



Characteristics of Covalent (Molecular) Compounds

1. They have relatively **low** melting points.
2. They **do not** conduct electricity when solid or when dissolved in water. (A **non-electrolyte**)

Intro Video to Bonding

Crash Course

<http://www.youtube.com/watch?v=a8LF7JEb0IA&list=PL8dPuuaLjXtPHzzYuWy6fYEaX9mQQ8oGr&index=24>

Activity 1: Part A

Classify the bonds as ionic or covalent

Remember:

Ionic – metal and non-metal

Covalent – non-metal and non-metal

Activity 1: Part B

Draw the Lewis diagram showing the atoms combining to make compounds.

Covalent Example:

<http://www.kentchemistry.com/links/bonding/covalentlewisdot.htm>

Analogy: Bonding and Candy

Ionic:

In a playground at recess, a Grade 3 has a chocolate bar. A Grade 8 student takes the chocolate bar from the Grade 3 and the Grade 3 follows the Grade 8 around for the rest of recess, trying to get some of it back.

Covalent:

A Grade 3 has a chocolate bar and she can share it with as many students as she wants

Video

- [https://www.youtube.com/watch?v=...](#)

