

CHEMISTRY III

Bohr Models

Ions

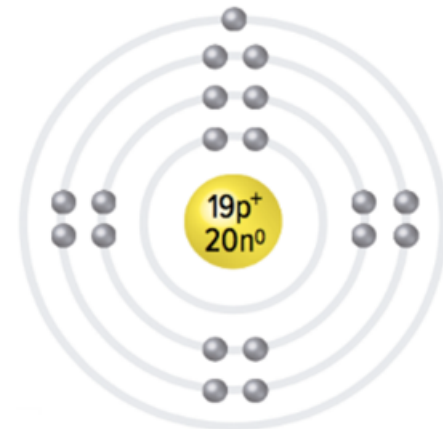
Bohr Models

Bohr models are a way of representing the electron arrangements of atoms using energy shells.

- Shows how many electrons occupy each specific energy level/shell.

There is a maximum amount of electrons that are able to occupy each energy shell.

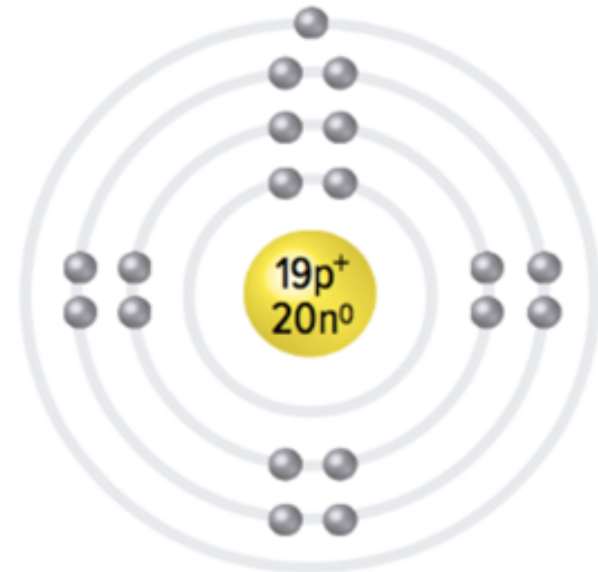
- First shell: 2 electrons
- Second shell: 8 electrons
- Third shell: 8 electrons



Bohr Models

The last shell that contains electrons is called the valence shell.

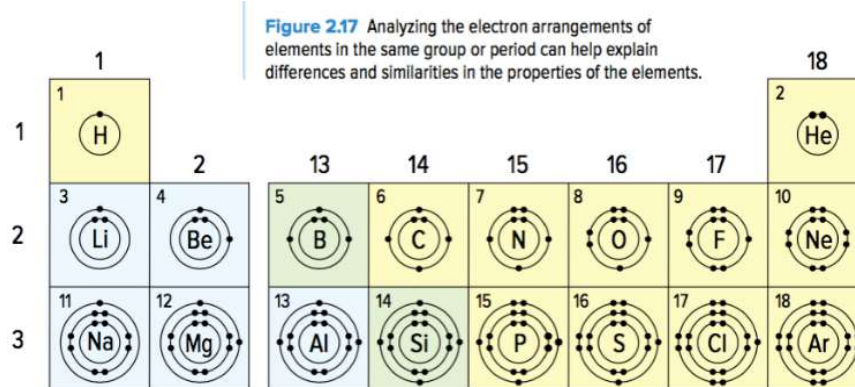
- The electrons that occupy the valence shell is called valence electrons.



Bohr Models

Some patterns that we can see on the periodic table:

- Atoms in the same group have the same number of valence electrons
- Atoms in the same period have the same number of occupied energy shells



How do we draw Bohr models?

1. State the number of protons and neutrons in the middle.
2. Find the number of electrons the element contains.
3. Draw the first energy shell and fill in the electrons. Keep in mind that the first energy shell can contain a maximum of TWO electrons.
4. Once the energy shell is full, draw the next shell and continue to draw out the electrons. Be sure to place the electrons in pairs if possible.

Practice: Helium atom and Sodium Atom

Ions

Video:

https://www.youtube.com/watch?v=PCZtnbxtXqE&ab_channel=Cognito

Ions

Many elements do not occur naturally on their own as they are unstable elements. In order for elements to become stable, they often form ions in order to achieve a full valence shell.

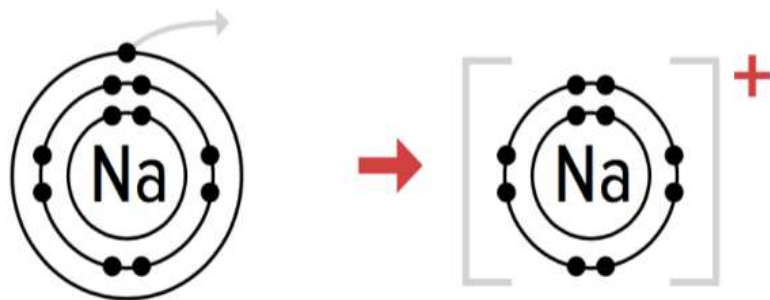
An ion is formed when elements either lose or gain an electron. Ions are defined as a charged atom.

- It is considered to be a charged atom because the number of electrons and the number of protons do not match.

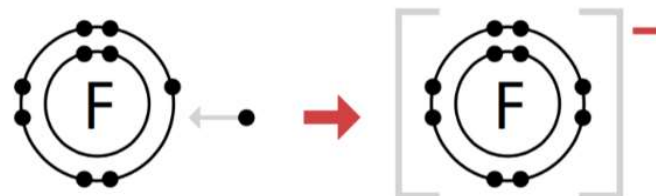
Ions

In order to achieve a full valence shell, elements will either lose or gain electrons. When atoms...

- Loses an electron: becomes a positively charged ion
- Gains an electron: becomes a negatively charged ion



Ions



We can figure out if atoms gain/lose electrons by looking at their ion charges.

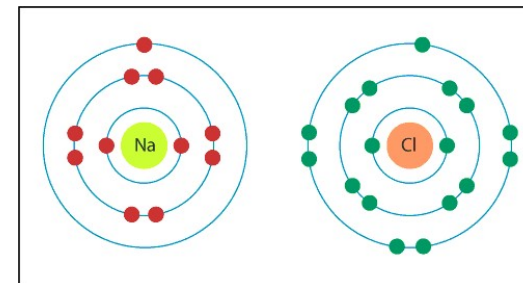
- When the ion charge is positive (e.g.: +1), the atom is LOSING electrons. This is called a cation.
- When the ion charge is negative (e.g.: -1), the atoms is GAINING electrons. This is called an anion.

The number associated with the ion charge is the amount of electrons that atoms will gain or lose.

11	+
Na	
Sodium	
23.0	

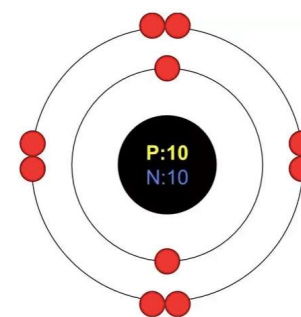
8	2-
O	
Oxygen	
16.0	

Note:



Reactivity of an element is linked to how close it is to having a full valence shell.

- The most reactive families (Group 1 and Group 17) are only one electron away from a full valence shell.
- Noble gases (Group 18) are stable (unreactive) because they have full valence shells.
 - These atoms do not tend to gain, lose, or share electrons.



How do we draw Bohr models for ions?

1. State the number of protons and neutrons in the middle.
2. Determine the ion charge of the element and find the number of electrons the element contains. Note: positive ions mean remove electrons while negative ions mean receive electrons.
3. Draw the first energy shell and fill in the electrons. Keep in mind that the first energy shell can contain a maximum of TWO electrons.
4. Once the energy shell is full, draw the next shell and continue to draw out the electrons. Be sure to place the electrons in pairs if possible.
5. Once all the electrons have been placed in the model, draw square brackets around the model and write the ion charge of the element on the top right hand corner OUTSIDE of the square brackets.

Practice: Sulphur ion and Sodium ion

Practice:

Complete the two tables at the back of the notes.