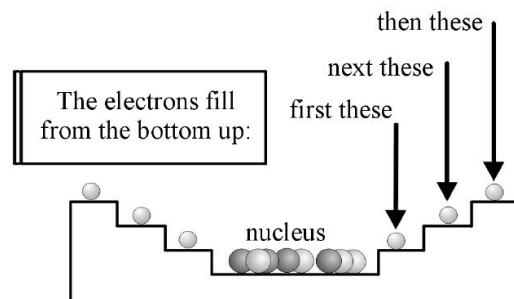


Bonds, Ionic Bonds

Part 1: Review

We know from earlier:

- A **neutral atom** has the same number of **electrons** and **protons**.
- Since electrons are attracted to the **nucleus**, they fill the lower **energy levels** first.
- Once a given level is full, electrons start filling the next level.



Part 2: Valence Electrons

Using the atom builder, build each element below. All of these atoms will be **neutral (no charge)**. Record the information in the table. Use the most common isotope by rounding the average atomic weight to the nearest whole number.

Protons = Green

Neutrons = Blue

Electrons = Yellow

Element	Atomic Number	Valence Electrons	Open Spots in Valence Shell
Hydrogen			
Helium			
Lithium			
Fluorine			
Sodium			
Chlorine			
Neon			

Teacher signature: Used board & marbles to model above elements _____

Part 3: Modeling a Chemical Bond

Atoms that have a complete outermost energy level are stable. If there are empty holes, an atom will either, **gain, lose, or share electrons** with another atom in order **to complete its valence shell** and become stable. When atoms gain, lose, or share electrons with another atom, they form **chemical bonds**.

Pair up with another group, the one at your table if possible. One group build a sodium atom, and the other build a chlorine atom. Put them next to each other and answer the questions.

1. In order to complete its valence energy level, do you think sodium will tend to lose its only valence electron, or gain seven? Explain your answer. Hint: What would the charge be if it lost one? What would the charge be if it gained 7?

2. In order to complete its valence energy level, do you think chlorine will tend to lose all of its valence electrons, or gain one? Explain your answer. Hint: Think about the possible charges!
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3. Why might these two atoms bond together to form a compound? In your answer, describe what you think might happen when sodium and chlorine form a chemical bond? Hint: It's about charges again!
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Part 4: Modeling Chemical Bonds - do AFTER Learning Lewis Dot Structures

1. Which particle is involved in forming chemical bonds with other atoms? _____
2. Which electrons are involved in forming chemical bonds? _____

Draw the Lewis dot structures for each set of atoms and use arrows show how the electrons form bonds. You have two attempts. Check with a teacher after the first attempt and get more instruction, for the second attempt.

Atom Groups	Attempt 1	Attempt 2
1 C (carbon) and 4 H (hydrogen) : This is COVALENT. Electrons are SHARED.	 Teacher signature: _____	 Teacher signature: _____
2 Li (lithium) and 1 O (oxygen): This is IONIC. Electrons are GIVEN and TAKEN.	 Teacher signature: _____	 Teacher signature: _____
1 Be (beryllium) and 2 F (fluorine): This is IONIC. Electrons are GIVEN and TAKEN.	 Teacher signature: _____	 Teacher signature: _____

Answer the following questions:

1. Remove the valence electron from sodium. What has happened to the balance of positive and negative charges? What is sodium's **oxidation number**?

2. Place that electron into the chlorine atom. What happens to chlorine's charge? What is chlorine's **oxidation number**?

3. What is the overall charge of sodium and chlorine when they form a molecule? _____

Conclusion:

Fill in the table below. You may want to build these with your set.

Element	Valence Electrons	Oxidation Number
Magnesium		
Oxygen		
Calcium		
Potassium		
Argon		
Carbon		

1. What does the oxidation number tell us, and why is it useful?

2. In an ionic bond, what has to be true of the total oxidation/charge of the molecule?

3. Which of the elements from the table above could form an ionic bond with each other?
