8 BONDING BASICS: HOW ATOMS STICK TOGETHER

In this lesson, we'll unlock the secret behind how atoms team up to create everything around us. We're diving into the world of chemical bonds—where atoms share or trade tiny particles called electrons to stick together and form all the molecules around us! From the salt on your fries to the water in your bottle, bonds are what make it all happen.

Recommended Reading

- *Investigating Atoms and Molecules*, by Jessica Rusick, pp. 16-25
- *How Do Molecules Stay Together?* by Madeline J. Hayes

ACTIVITY Building Stable Molecules: A Hands-On Bonding Demonstration

It's time to see how atoms "stick together" to create the molecules you see all around you. In this hands-on activity, you'll have the opportunity to discover how ionic and covalent bonds form to make atoms stable.

SUPPLIES

- Cardstock
- Scissors
- Metal brads

INSTRUCTIONS

1. Begin this activity by copying the cut-out atoms on the following pages onto cardstock.
2. Cut out each of the atoms.
3. Insert brads into each of the yellow circles. These circles represent the atom's electrons.

Ionic bonding

4. For this part of the activity, you need a chlorine (Cl) and a sodium (Na) atom. Use your periodic table from lesson 5 to look up answers to the following questions:
   - Is sodium a metal or nonmetal? _____
   - Is chlorine a metal or nonmetal? _____
5. Looking at your atoms, determine the number of valence electrons, the electrons in the outermost shell, each atom has.
   - Sodium: _____
   - Chlorine: _____

6. If sodium and chlorine were to come near each other, sodium would give its one valence electron to chlorine. Move sodium's valence electron to chlorine's outer valence shell.

   - How many valence electrons does sodium now have? _____
   - What is sodium's charge since it gave away an electron? _____
   - How many valence electrons does chlorine now have? _____
   - What is chlorine's charge since it took one of sodium's electrons? _____
   - What happens when a positively charged and negatively charged atom are near one another?

_____

Covalent Bonding

7. For this part of the activity, you need a fluorine (F) and chlorine (Cl) atom. Use your periodic table from lesson 5 to look up answers to the following questions:

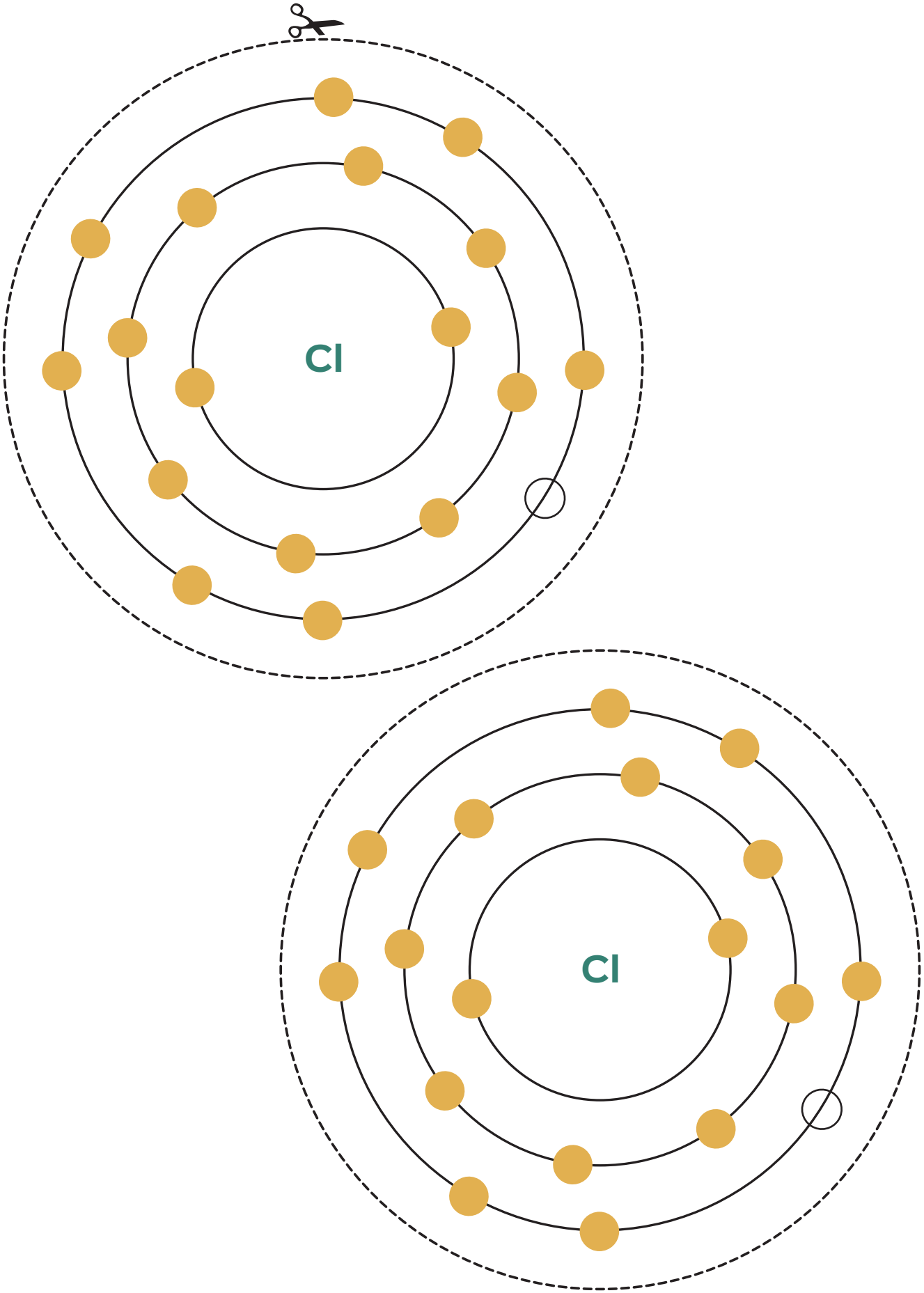
   - Is fluorine a metal or nonmetal? _____
   - Is chlorine a metal or nonmetal? _____

8. Looking at your atoms, determine the number of valence electrons, the electrons in the outermost shell, each atom has.

   - How many valence electrons does fluorine have? _____
   - Have many valence electrons does chlorine have? _____

9. If chlorine and fluorine were to come near to one another, they would share valence electrons. Adjust the brads so one of chlorine's electrons is inserted into the empty space fluorine has and one of fluorine's electrons is inserted into the empty space chlorine has.

   - How many valence electrons does fluorine have now? _____
   - How many valence electrons does chlorine have now? _____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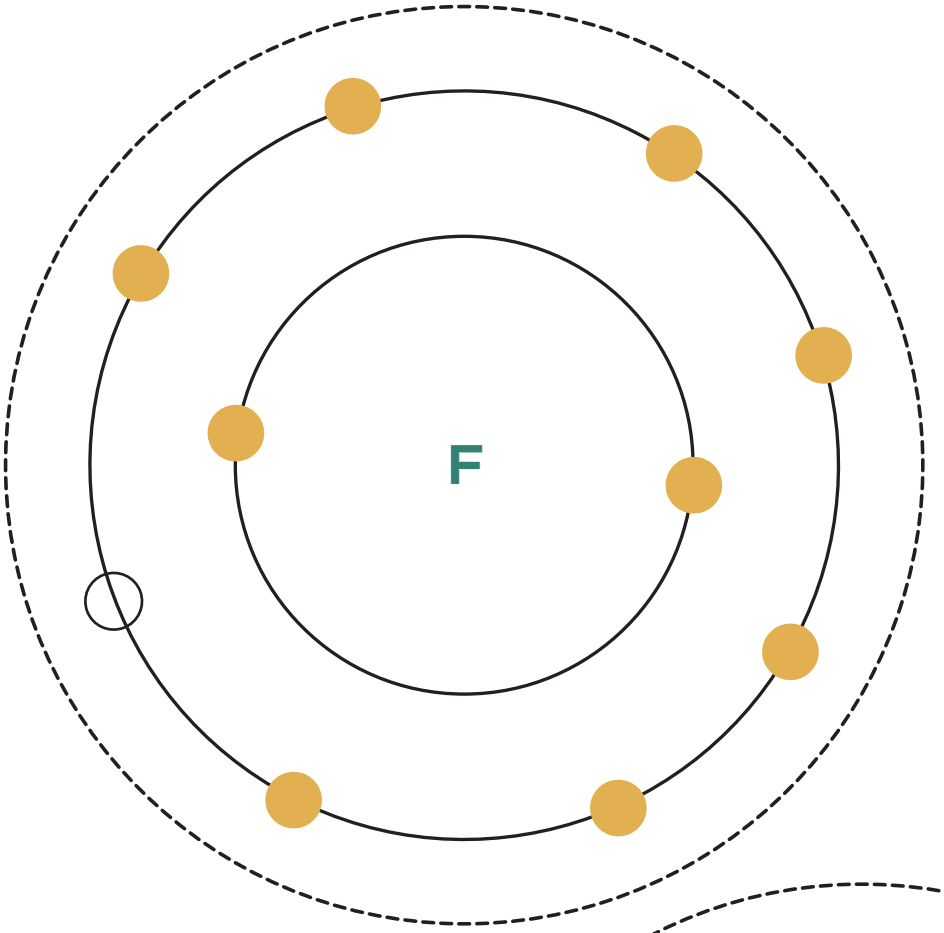
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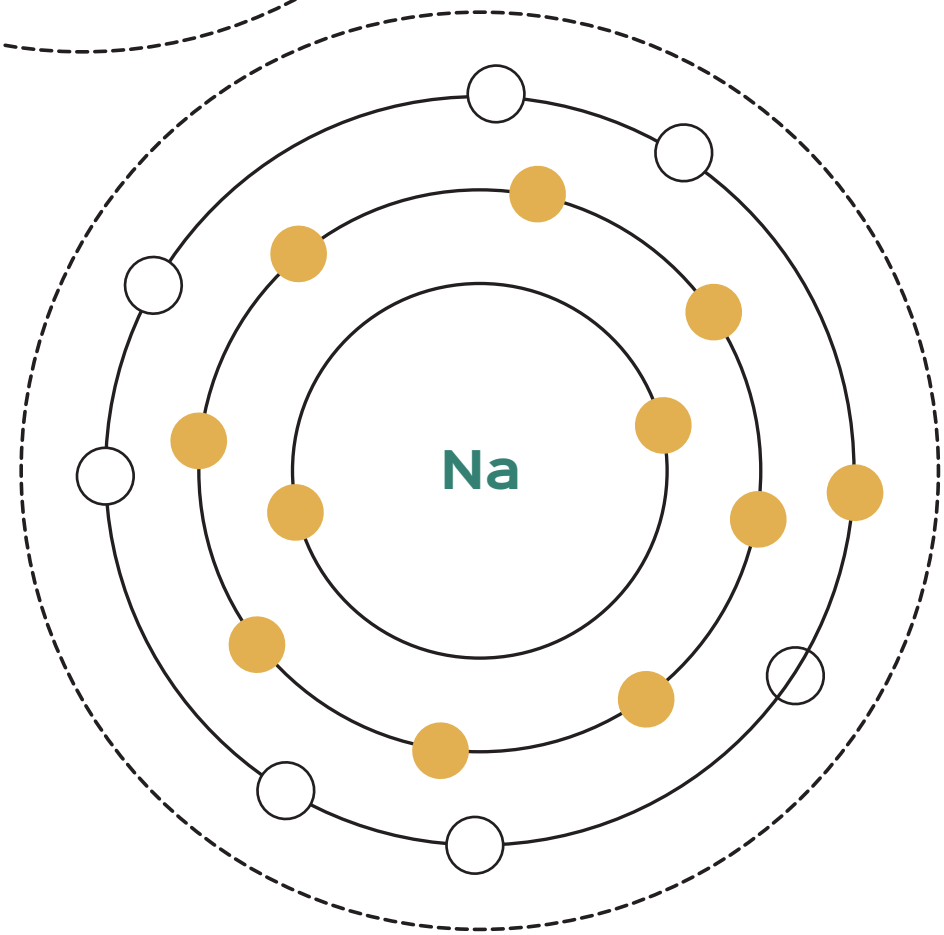
Na

QUESTION:

What is a chemical bond?

ANSWER:

Bonds are the attraction between atoms allowing them to form stable molecules.

LESSON 8

QUESTION:

How do bonds between atoms form?

ANSWER:

Bonds form when atoms give away, take, or share electrons.

LESSON 8

QUESTION:

What are the types of bonds that occur?

ANSWER:

Ionic bonds form when one atom gives away electrons and another takes them. Covalent bonds form when atoms share electrons.

LESSON 8

LESSON 8: LINUS PAULING

The structure of a substance is determined by the bonds between its atoms. The nature of these bonds, in turn, determines its properties.

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The structure of a substance is determined by the bonds between its atoms. The nature of these bonds, in turn, determines its properties.

Lesson 8 Quiz

1. What is a chemical bond?

A) A physical connection between two objects
B) The attraction between atoms that allows them to form molecules
C) A type of chemical reaction
D) The movement of electrons in an atom

2. Which of the following is true about electrons?

A) They have a positive charge.
B) They are found in the nucleus of an atom.
C) They help atoms bond by transferring or sharing.
D) They are the largest part of an atom.

3. Why do atoms form chemical bonds?

A) To share energy
B) To become stable by filling their outer electron shell
C) To move faster in space
D) To create new atoms

4. Ionic bonds form between two nonmetals and covalent bonds form between a metal and a nonmetal.

A) True
B) False

5. What happens when two atoms form a covalent bond?

A) The atoms give away electrons to each other.
B) The atoms share electrons with each other.
C) The atoms lose all their electrons.
D) The atoms become ionized.

6. What do atoms need to do to be stable?

A) Have an equal numbers of protons and electrons
B) Fill their outer electron shell
C) Have more neutrons than protons
D) Have an even number of electrons

7. In an ionic bond, what happens to the electrons?

A) They are shared equally between atoms.
B) One atom gives away electrons, and the other takes them.
C) The electrons disappear.
D) Electrons are not involved in ionic bonding.

8. Ionic bonds typically occur:

A) between two metals
B) between two nonmetals
C) between a metal and nonmetal
D) between two gases