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Lesson: Covalent and Ionic Bonds

Lesson Objective: To understand the way and why electrons are distributed in covalent bonds (sharing) and ionic bonds (giving/taking). Students will identify the differences between these bonds, as well as be able to articulate where else in their lives they are able to share, give, and take.

Essential Questions: How are electrons distributed in a covalent bond? How are electrons distributed in an ionic bond? Why do atoms bond in these ways? Where do we see these kind of covalent and ionic relationships in our own lives?

Virginia SOLs: **CH.2** The student will investigate and understand that the placement of elements on the periodic table is a function of their atomic structure. The periodic table is a tool used for the investigations of d) families or groups; g) electron configurations, valence electrons, and oxidation numbers. **CH.3** The student will investigate and understand how conservation of energy and matter is expressed in chemical formulas and balanced equations. Key concepts include c) writing chemical formulas; d) bonding types.

Duration: 90 Minutes

Lesson Activities

Cover the Space

Activity Focus: We will warm up with this physical activity that will double as a quick primer and review for the rest of the lesson.

Directions: Each student is an *atom*. Every student will receive a nametag, half with either a + symbol, or half with a - symbol. Students will walk around the room following the given commands that include:

Cues:

Go: Students will walk around the space.

Stop: Students will stop where they are at.

Jump: Students will jump in the air one time.

Clap: Students will clap one time.

Electron Shell: Students will get into groups of eight and say “Stable”. If there are students who are not in a group of eight, they will shake their bodies and say “unstable”.

Covalent Bond: Students will find a partner, stand back to back and lean against each other.

Ionic Bond: Students with + will find a partner with -. Students with + will talk about a time when you gave a gift to someone. Students with – will talk about when they received a gift from someone.

Debrief Questions:

- If you all are molecules when were you stable? **Where there was a group of eight.**
- Of what does there have to be a group of eight? **Electrons.**
- What were you sharing here? **Weight.**
- What do atoms share in covalent bonds? **Electrons.**

- What do atoms give in ionic bonds? **Electrons.**
- What is the charge of the atom that gives the electron? –
- What is the charge of the atom that receives the electron? +
- These molecules gained or lost an election, what are they called? **Ions.**

Share, Give or Receive

Activity Focus: Students will reflect on different parts of their lives where they are likely to share with, give to, and receive from others. They will then identify these relationships as either *covalent* or *ionic*.

Directions: Students will write on a piece of paper (their electron), one thing they share with others, one thing they give to others and one thing they receive from others. I will collect the responses.

The room will be separated in half. One half is the *covalent bond* half while the other is the *ionic bond* half. I will read off one of the “electrons”. If the students would feel more stable, or comfortable, sharing this “electron”, they will go to the *covalent bond* side of the room. If they would feel more stable either giving it away or receiving it, they will walk over to the *ionic bond* side of the room.

Debrief Questions:

- Did your mind change based on what you heard from your classmates?
- What did you notice about your classmates’ decisions?

Bonding Interactions

Activity Focus: Students will identify real life chemical bonds as either *covalent* or *ionic*. They will express their answers physically as well as verbally.

Directions: Students will get into groups. Each group will receive one of the following elemental relationships. Students will create a tableau (frozen image) that represents if this relationship is covalent or ionic (if it’s an ionic bond, who’s giving and who’s taking). One student from each group will tell the rest of the class what relationship they received.

Element Relationships:

1. An atom of chlorine accepts the one electron a sodium atom has to offer. Both atoms are now stable, so they bond.
2. Two oxygen atoms bond together to be stable, but neither has to give up electrons.
3. In order to have stability, a carbon atom must share its electrons with four hydrogen atoms.
4. Lithium gives its lone electron to fluorine. They both bond because they are stable.