



Science Objectives

- Students will determine the ratio of two nonmetals needed to form a stable covalent compound or polyatomic ion.
- Students will relate the sharing of electrons to the formation of molecules.
- Student will learn how to write formulas for covalent compounds.

Vocabulary

- | | |
|---------------------|---------------------|
| • atom | • metal |
| • covalent compound | • molecule |
| • duet | • nonmetal |
| • electron | • octet |
| • electronegativity | • oxidation state |
| • electronegative | • valence electrons |
| • electropositive | |

About the Lesson

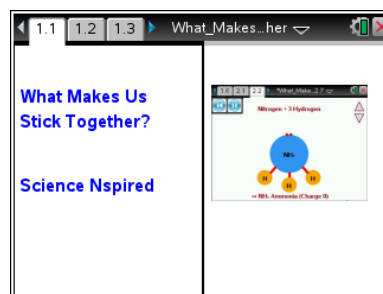
- This simulation gives a macroscopic view of what occurs microscopically when two nonmetals react.
- As a result, students will:
 - Better understand how molecules are formed.
 - Be able to write formulas for covalent compounds.

TI-Nspire™ Navigator™

- Send out the *What_Makes_Us_Stick_Together.tns* file.
- Monitor student progress using Screen Capture.
- Use Live Presenter to spotlight student answers.

Activity Materials

- *What_Makes_Us_Stick_Together.tns* document
- TI-Nspire™ Technology
- Electronegativity table



TI-Nspire™ Technology Skills:

- Download a TI-Nspire document
- Open a document
- Move between pages
- Use minimized sliders

Tech Tips:

Make sure that students understand how to change values of minimized sliders by clicking the arrows.

Lesson Materials:

Student Activity

- *What_Makes_Us_Stick_Together.doc*
- *What_Makes_Us_Stick_Together.pdf*

TI-Nspire document

- *What_Makes_Us_Stick_Together.tns*



Discussion Points and Possible Answers

Have students read the background information on the activity sheet before starting the activity.

Move to pages 1.2–1.6.

Have students answer questions 1–5 on the handheld, the activity sheet, or both.

Q1. Covalent compounds are made up of two or more _____.

Answer: C. nonmetals

Q2. Covalent compounds reach stability by acquiring _____ in their outer electron shell.

Answer: D. an octet

Q3. Electrons in the outer shell of an atom are called _____ electrons.

Answer: B. valence


Q4. The measure of the tendency to attract shared electrons to an atom is called _____.

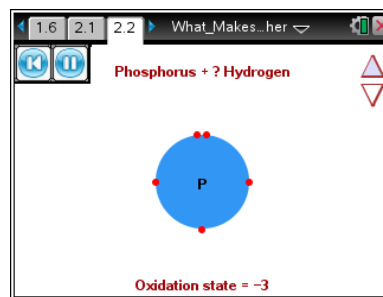
Answer: B. electronegativity

Q5. The oxidation states of all atoms in a covalent compound must total to _____.

Answer: C. 0

Move to pages 2.1 and 2.2.

1. Students will explore covalent bonds on page 2.2. They will press the reset button  or `esc` to generate new elements.
2. The number of bonded atoms can be increased and decreased using the arrows on the right side of the screen or press a number 1–4. Only the number in front the second element changes.
3. As students increase the number of bonded atoms, they should record their observations of the changes in the equations and the model in the center of the screen.

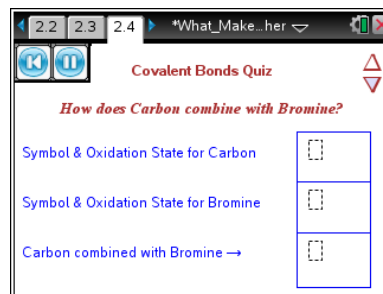


Tech Tip: When students press the reset button for a new question, the number of bonded atoms will automatically be reset to zero.



Move to pages 2.3 and 2.4.

- Students are to first read the instructions for the Covalent Bonds Quiz on page 2.3. To check their answer they can press . To go to the next question students press .
- On page 2.4, have students work through the quiz until they get five correct compounds. They should record the compounds in the space provided on their activity sheet.



Suggestion: Encourage them to also record the oxidation states of the elements on their activity sheet for later reference.

Tech Tip: Students will need to input the chemicals and oxidation states using inputs such as “H⁺” for hydrogen, “H₂O” for water, and “CO₃²⁻” for CO₃²⁻.

Move to pages 3.1–3.10.

Have students answer questions 6–15 on the handheld, the activity sheet, or both.

- Q6. When carbon and chlorine combine to make carbon tetrachloride, CCl₄, a total of eight electrons are _____.

Answer: C. shared

- Q7. When hydrogen chloride gas (HCl) is formed, each atom shares _____ electron(s).

Answer: A. one

- Q8. When hydrogen and sulfur react to make a covalent compound, _____ hydrogen atom(s) will combine with _____ sulfur atom(s).

Answer: C. two, one

- Q9. When nitrogen and hydrogen react to make ammonia, _____ hydrogen atom(s) will combine with _____ nitrogen atom(s).

Answer: C. three, one

- Q10. For the compound SCl₂, the sulfur will share _____ electron(s) with each chlorine atom.

Answer: A. one



Q11. For the compound SCl_2 , how many total electrons will be shared between the sulfur and chlorine?

Answer: B. two

Q12. For the compound SCl_2 , the sulfur will be _____ and the chlorine will be _____.

Answer: B. electropositive, electronegative

Q13. Why will a solution of table salt conduct electricity but a table sugar solution will not?

Answer: In aqueous solution, table salt consists of ions that can conduct electricity, while sugar consists of neutral molecules that cannot conduct electricity.

Q14. Even though sugar and ethyl alcohol are made of the same three elements, why are their properties so different? (Reread the discussion section at the beginning of the activity.)

Answer: Even though they contain the same three elements, they contain different numbers of each atom, and the atoms are arranged differently.

Q15. Why are covalent compounds made up of nonmetals?

Answer: Because of their relatively high electronegativity, nonmetals tend to share electrons rather than transfer them as metals do.

TI-Nspire Navigator Opportunities

Use TI-Nspire Navigator to capture screen shots of student progress and to retrieve the file from each student at the end of the class period.

Wrap Up

When students are finished with the activity, retrieve the .tns file using TI-Nspire Navigator. Save grades to Portfolio. Discuss activity questions using Slide Show.

Assessment

- Formative assessment will consist of questions embedded in the .tns file. The questions will be graded when the .tns file is retrieved by TI-Nspire Navigator. The TI-Nspire Navigator Slide Show can be utilized to give students immediate feedback on their assessment.
- Summative assessment will consist of questions/problems on the chapter test, inquiry project, performance assessment, or an application/elaborate activity.