

Bonding Clues

Track what electrons do when compounds form.

PS.3.c "compounds form through ionic and covalent bonding; and"

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline the four compound formulas. Circle each phrase that tells whether electrons are transferred or shared, then use your marks to compare ionic and covalent bonding.

How Atoms Join

- ① Atoms can become more stable when their outer energy levels are filled. In ionic bonding, a metal atom transfers one or more electrons to a nonmetal atom. The metal becomes a positive ion, and the nonmetal becomes a negative ion. Opposite charges attract, holding the ions together in an ionic compound. For example, sodium and chlorine form sodium chloride, NaCl. This formula shows a one-to-one ratio of sodium ions to chloride ions in the solid compound.
- ② Covalent bonding happens when nonmetal atoms share electrons. Shared electrons are attracted to the nuclei of both atoms, so the atoms stay connected. A water molecule, H₂O, has oxygen covalently bonded to hydrogen atoms. Carbon dioxide, CO₂, also has covalent bonds, connecting carbon and oxygen atoms. Covalent substances can consist of separate molecules. Unlike an ionic compound, a molecule is not a repeating pattern of positive and negative ions. In an ionic solid, ions are locked in a repeating lattice.
- ③ Bond type depends on what happens to electrons, not simply on the number of atoms shown in a formula. Magnesium oxide, MgO, is ionic because magnesium transfers electrons to oxygen, producing oppositely charged ions that attract. Water and carbon dioxide are covalent because their atoms share electrons. Both kinds of bonding create compounds with new properties. Knowing whether electrons were transferred or shared helps scientists explain why particles are held together inside a sample of matter around us.

2 ANSWER WITH EVIDENCE Use the passage

1 What happens to electrons in ionic bonding, and what happens to electrons in covalent bonding?

2 Why do the ions in an ionic compound stay together?

3 Classify NaCl and CO₂ as ionic or covalent. Use the passage to explain each choice.

4 How is the particle arrangement in an ionic solid different from a covalent molecule?

3 YOUR TURN Your own words

Use the two panels to model two kinds of bonding. In Panel 1, sketch MgO to show electron transfer, positive and negative ions, and attraction. In Panel 2, sketch H₂O to show atoms sharing electrons. Write one caption under each panel.

PART 1 • READ AND MARK

Underline the four compound formulas. Circle each phrase that tells whether electrons are transferred or shared, then use your marks to compare ionic and covalent bonding. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What happens to electrons in ionic bonding, and what happens to electrons in covalent bonding?	In ionic bonding, electrons are transferred. In covalent bonding, electrons are shared.
2	Why do the ions in an ionic compound stay together?	Positive and negative ions attract each other.
3	Classify NaCl and CO ₂ as ionic or covalent. Use the passage to explain each choice.	NaCl is ionic because sodium transfers electrons to chlorine, forming oppositely charged ions. CO₂ is covalent because carbon and oxygen share electrons.
4	How is the particle arrangement in an ionic solid different from a covalent molecule?	An ionic solid has a repeating lattice of positive and negative ions. A covalent substance can have separate molecules.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Panel 1: MgO. Draw magnesium transferring electrons to oxygen, then label Mg²⁺ and O²⁻ as oppositely charged ions that attract. Caption: MgO is ionic because electrons are transferred. Panel 2: H₂O. Draw oxygen connected to two hydrogen atoms, with a shared electron pair between oxygen and each hydrogen. Caption: H₂O is covalent because the atoms share electrons.

Accept equivalent wording that accurately distinguishes electron transfer from electron sharing. In the sketches, accept simple particle symbols if the ionic panel shows oppositely charged ions and the covalent panel shows shared electrons.