Dots Tell Bonds

Use outer electrons to model sharing and transfer.

CHE.2.a "Develop and use Lewis dot diagrams to model the formation of covalent and ionic bonds."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Circle each atom's starting valence-electron count. Underline the words that tell you where electrons go when atoms bond.

What the Dots Reveal

1. A Lewis dot diagram tracks an atom's valence electrons, the electrons in its outer shell. Write the element symbol and place one dot for each valence electron around it. Put single dots on separate sides before pairing them. Hydrogen has one valence electron and becomes stable with two electrons nearby. Lithium has one valence electron, fluorine has seven, oxygen has six, and carbon has four. Most other atoms in these examples tend toward eight electrons around them.

2. In a chlorine molecule, each chlorine atom starts with seven valence electrons. Each has one unpaired dot. When two chlorine atoms share those unpaired electrons, the pair belongs to both atoms. In a Lewis diagram, two dots between the symbols show the shared pair. Three lone pairs remain on each chlorine. Each chlorine now counts eight electrons around it. This is a covalent bond: the atoms share electrons rather than transfer them.

3. A grain of table salt contains sodium and chloride ions. A sodium atom begins with one valence electron, and a chlorine atom begins with seven. Sodium transfers its electron to chlorine. The resulting Na^+ has no dots in its Lewis ion symbol, while $[Cl]^-$ has eight dots, arranged as four pairs. Opposite charges attract, forming an ionic bond. The charges show that an electron moved; dots between the ions would wrongly suggest sharing.

2 ANSWER WITH EVIDENCE

Use the passage

1. Draw a Lewis dot diagram for H_2. How many electrons does each H count?

2. Draw a Lewis dot diagram for HF. Show the shared pair and every lone pair.

3. Draw Lewis ion symbols for LiF after electron transfer. Show dots and charges.

4. Draw a Lewis dot diagram for O_2. How many electron pairs do the atoms share?

3 YOUR TURN

Your own words

Draw a Lewis dot diagram for CO_2 using the valence counts in the passage. Show every shared and lone pair, then label each bond as covalent or ionic.

ANSWER KEY

Dots Tell Bonds

PART 1 · READ AND MARK

Circle each atom's starting valence-electron count. Underline the words that tell you where electrons go when atoms bond. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Draw a Lewis dot diagram for H_2. How many electrons does each H count?	**H:H. The shared pair lets each H count two electrons.**
2	Draw a Lewis dot diagram for HF. Show the shared pair and every lone pair.	**H:F(··)(··)(··). The pair between H and F is shared; F has three lone pairs.**
3	Draw Lewis ion symbols for LiF after electron transfer. Show dots and charges.	**Li^+ has no dots; $[F]^-$ has eight dots in four pairs.**
4	Draw a Lewis dot diagram for O_2. How many electron pairs do the atoms share?	**O(··)(··)::O(··)(··). The atoms share two pairs; each O also has two lone pairs.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

O(··)(··)::C::O(··)(··). Each pair of colons shows two shared pairs between C and O. Both C to O bonds are covalent.

Accept dots placed on any sides if the electron counts, shared pairs, lone pairs, and charges are correct. A line may replace each shared pair if students identify what the line represents.