A2 · Valence electrons and electron dot diagrams for atoms · Worked examples and practice

Name: _____ Date: _____

Worked examples

Read these first. There is one for each kind of question in this lesson.

Example 1 · Draw the electron dot diagram of an atom

Draw the electron dot diagram for a nitrogen atom.

1. Find the group number: nitrogen is in group 15.
2. Count the valence electrons: use the last digit, so nitrogen has 5.
3. Place one dot on each side, up to four: that uses 4 dots.
4. Pair the rest, one side at a time: the fifth dot makes 1 pair.
5. Check: the dots, 5, equal the valence electrons.

Answer: N with five dots: one pair and three single dots.

Example 2 · Find the bonding electrons and lone pairs

An oxygen atom has 6 valence electrons. How many bonding electrons and lone pairs does its diagram show?

1. Four dots go on the four sides. The other two dots make pairs.
2. So the diagram has 2 pairs and 2 single dots.
3. A single dot is a bonding electron. Two dots together are a lone pair.

Answer: Oxygen has 2 bonding electrons and 2 lone pairs.

Practice

Questions 1 to 4 are easy. Questions 5 to 8 are medium. Questions 9 and 10 are harder.

EASY

1. Magnesium is in group 2. How many valence electrons does a magnesium atom have?

EASY

2. Bromine is in group 17. How many valence electrons does a bromine atom have?

EASY

3. Draw the electron dot diagram for a carbon atom. Carbon is in group 14. Say how many dots are paired.

EASY

4. What does the octet rule say?

MEDIUM

5. Draw the electron dot diagram for an oxygen atom. Oxygen is in group 16. Say how many lone pairs and bonding electrons it has.

MEDIUM

6. Draw the electron dot diagram for a neon atom. Neon is in group 18. Explain why neon forms no bonds.

MEDIUM

7. An electron dot diagram has three lone pairs and one bonding electron. How many valence electrons does the atom have? Name its group.

MEDIUM

8. Explain why a hydrogen atom is full with only 2 electrons.

HARDER

9. Sodium is a metal in group 1. Sulfur is a non-metal in group 16. Say how each one reaches a full outer level when they meet. Give each ion.

HARDER

10. The electron dot diagram of an atom X has two lone pairs and two bonding electrons. X is in the second row of the periodic table. Name the element. Then say how many more electrons it needs to reach 8.