

## Practice: Covalent Compounds

### Covalent Compounds

Covalent compounds are formed when electrons are shared between non-metal atoms. (Keep in mind that outer orbit electrons are called valence electrons and “co” means share.) Explain why the term “covalent” compound is appropriate.

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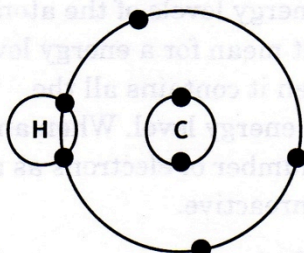
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Intersecting circles on the outer orbit of a Bohr model atom illustrate how atoms can share electrons in a covalent bond. This way of representing covalent bonds is not completely correct but it is a good illustration.

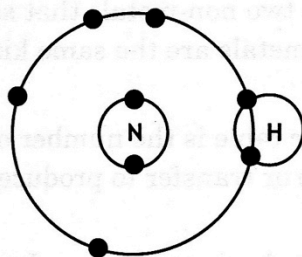
Use the Bohr model to show how the following molecules are formed. Part of the molecule is included in each drawing. Your task is to complete the molecule.

a) methane  $\text{CH}_4$



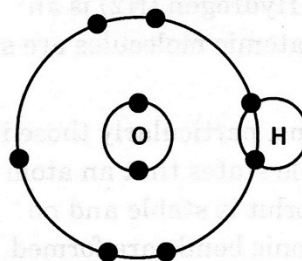
Notice that the formula for methane tells you that one carbon atom combines with four hydrogen atoms to form one molecule of methane. Draw three more hydrogen atoms like the one shown. Have the Bohr diagrams for each hydrogen atom intersect with the outer energy level of carbon so that they combine with each of the three remaining single electrons. Check the answers.

b) ammonia  $\text{NH}_3$

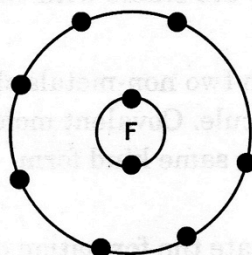


Notice that the formula for ammonia tells you that one nitrogen atom combines with three hydrogen atoms to form one molecule of ammonia. Draw two more hydrogen atoms like the one shown. Have the Bohr diagrams for each hydrogen atom intersect with the outer energy level of nitrogen so that they combine with each of the two remaining single electrons. Check the answers.

c) water  $\text{H}_2\text{O}$



d) hydrogen fluoride  $\text{HF}$



### Learning Activity

1. How does a covalent bond differ from an ionic bond?

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2. What is the octet rule?

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3. What is a diatomic molecule?

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4. What is the smallest unit of a covalent compound?

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5. Why is it important that oxygen forms a diatomic molecule?

**Do not do this question.**

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6. A list of pairs of atoms is shown below. Indicate whether each pair would form a compound using an ionic bond or a covalent bond.

calcium and bromine \_\_\_\_\_

hydrogen and oxygen \_\_\_\_\_

carbon and oxygen \_\_\_\_\_

lithium and oxygen \_\_\_\_\_

phosphorus and chlorine \_\_\_\_\_

7. Complete the drawings below. One atom of carbon is combining with four atoms of fluorine to form one molecule of a compound.

a) What kind of bond is used to make the compound?

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b) Place the proper number of electrons in the atoms in their proper orbits.

