

## Covalent Bonding Worksheet Answer Key PDF

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### Part 1: Building a Foundation

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#### What is a covalent bond?

undefined. A) A bond formed by the transfer of electrons

**undefined. B) A bond formed by the sharing of electron pairs between atoms ✓**

undefined. C) A bond formed by the attraction between ions

undefined. D) A bond formed by the sharing of protons

A covalent bond is formed by the sharing of electron pairs between atoms.

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#### Which of the following are types of covalent bonds? (Select all that apply)

**undefined. A) Single covalent bond ✓**

**undefined. B) Double covalent bond ✓**

undefined. C) Ionic bond

**undefined. D) Triple covalent bond ✓**

The types of covalent bonds include single, double, and triple covalent bonds.

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Types of covalent bonds include single, double, and triple covalent bonds.

**Describe the general properties of covalent compounds.**

**Covalent compounds typically have low melting and boiling points, are poor conductors of electricity, and can be gases, liquids, or solids at room temperature.**

**Describe the general properties of covalent compounds.**

**Covalent compounds typically have low melting and boiling points and do not conduct electricity.**

**List two characteristics of nonpolar covalent bonds.**

1. Characteristic 1

**Equal sharing of electrons.**

2. Characteristic 2

**No significant difference in electronegativity.**

Nonpolar covalent bonds have an equal sharing of electrons and do not have a significant difference in electronegativity between the bonded atoms.

**Which theory is used to predict the 3D shape of molecules?**

undefined. A) Quantum Theory

undefined. **B) VSEPR Theory ✓**

undefined. C) Kinetic Molecular Theory

undefined. D) Atomic Theory

VSEPR Theory is used to predict the 3D shape of molecules based on electron pair repulsion.

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## Part 2: Comprehension and Application

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**What determines the polarity of a covalent bond?**

undefined. A) The number of protons in the nucleus

undefined. **B) The difference in electronegativity between the bonded atoms** ✓

undefined. C) The size of the atoms

undefined. D) The temperature of the environment

The polarity of a covalent bond is determined by the difference in electronegativity between the bonded atoms.

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The difference in electronegativity between the bonded atoms determines the polarity of a covalent bond.

**Which of the following statements about covalent compounds are true? (Select all that apply)**

undefined. A) They conduct electricity in solid state.

undefined. **B) They have low melting and boiling points.** ✓

undefined. **C) They are often soluble in organic solvents.** ✓

undefined. **D) They are formed by the sharing of electrons.** ✓

Covalent compounds typically have low melting and boiling points, are often soluble in organic solvents, and are formed by the sharing of electrons.

**Which of the following statements about covalent compounds are true? (Select all that apply)**

undefined. A) They conduct electricity in solid state.

**undefined. B) They have low melting and boiling points. ✓**

**undefined. C) They are often soluble in organic solvents. ✓**

**undefined. D) They are formed by the sharing of electrons. ✓**

Covalent compounds typically have low melting and boiling points and are often soluble in organic solvents.

**Explain why covalent compounds generally do not conduct electricity.**

**Covalent compounds do not conduct electricity because they do not have free-moving charged particles, such as ions or electrons.**

**Explain why covalent compounds generally do not conduct electricity.**

**Covalent compounds do not conduct electricity because they lack free-moving charged particles.**

**Which molecular shape is predicted by VSEPR theory for a molecule with two bonding pairs and two lone pairs?**

undefined. A) Linear

**undefined. B) Bent ✓**

undefined. C) Trigonal planar

undefined. D) Tetrahedral

The molecular shape predicted by VSEPR theory for a molecule with two bonding pairs and two lone pairs is bent.

**Which molecular shape is predicted by VSEPR theory for a molecule with two bonding pairs and two lone pairs?**

undefined. A) Linear

**undefined. B) Bent ✓**

undefined. C) Trigonal planar

undefined. D) Tetrahedral

The predicted shape is bent due to the presence of lone pairs.

**Identify the correct Lewis structure representations for water (H<sub>2</sub>O). (Select all that apply)**

undefined. **A) H-O-H with two lone pairs on oxygen ✓**

undefined. B) H=O=H

undefined. C) H-O-H with no lone pairs

undefined. **D) H-O-H with one lone pair on oxygen ✓**

The correct Lewis structure representations for water include H-O-H with two lone pairs on oxygen and H-O-H with one lone pair on oxygen.

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undefined. **A) H-O-H with two lone pairs on oxygen ✓**

undefined. B) H=O=H

undefined. C) H-O-H with no lone pairs

undefined. D) H-O-H with one lone pair on oxygen

The correct Lewis structure for water includes two lone pairs on oxygen.

**Draw the Lewis structure for carbon dioxide (CO<sub>2</sub>) and describe its molecular geometry.**

**The Lewis structure for CO<sub>2</sub> shows a linear arrangement of atoms.**

**Draw the Lewis structure for carbon dioxide (CO<sub>2</sub>) and describe its molecular geometry.**

**The Lewis structure for carbon dioxide shows a carbon atom double bonded to two oxygen atoms, resulting in a linear molecular geometry.**

### Part 3: Analysis, Evaluation, and Creation

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**Which of the following molecules is likely to have a nonpolar covalent bond?**

undefined. A) HCl

undefined. **B) O<sub>2</sub> ✓**

undefined. C) NH<sub>3</sub>

undefined. D) H<sub>2</sub>O

O<sub>2</sub> is likely to have a nonpolar covalent bond due to equal sharing of electrons.

**Which of the following molecules is likely to have a nonpolar covalent bond?**

undefined. A) HCl

**undefined. B) O<sub>2</sub> ✓**

undefined. C) NH<sub>3</sub>

undefined. D) H<sub>2</sub>O

O<sub>2</sub> is likely to have a nonpolar covalent bond because it consists of two identical atoms sharing electrons equally.

**Analyze the following molecules and determine which have polar covalent bonds. (Select all that apply)**

undefined. A) CH<sub>4</sub>

**undefined. B) H<sub>2</sub>O ✓**

undefined. C) CO<sub>2</sub>

**undefined. D) NH<sub>3</sub> ✓**

H<sub>2</sub>O and NH<sub>3</sub> have polar covalent bonds due to differences in electronegativity.

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**undefined. B) H<sub>2</sub>O ✓**

undefined. C) CO<sub>2</sub>

**undefined. D) NH<sub>3</sub> ✓**

The molecules with polar covalent bonds include H<sub>2</sub>O, CO<sub>2</sub>, and NH<sub>3</sub>.

**Compare and contrast the properties of ionic and covalent compounds.**

**Ionic compounds typically have high melting points and conduct electricity in solution, while covalent compounds have lower melting points and do not conduct electricity.**

**Compare and contrast the properties of ionic and covalent compounds.**

Ionic compounds typically have high melting and boiling points, conduct electricity in solution, and form crystals, while covalent compounds have lower melting and boiling points and do not conduct electricity.

Design a molecule with a central atom that forms a tetrahedral shape. Which of the following could be the central atom? (Select all that apply)

undefined. A) Carbon (C) ✓

undefined. B) Nitrogen (N) ✓

undefined. C) Oxygen (O)

undefined. D) Silicon (Si) ✓

Central atoms that can form a tetrahedral shape include carbon, silicon, and possibly nitrogen.

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undefined. D) Silicon (Si) ✓

The central atoms that can form a tetrahedral shape include Carbon (C) and Silicon (Si).

Propose a real-world application or scenario where understanding covalent bonding is crucial, and explain its significance.

Understanding covalent bonding is crucial in drug design and materials development.

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Understanding covalent bonding is crucial in drug design, as it helps in predicting how molecules interact and bind to biological targets.