Covalent Bonding Worksheet

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Part 1: Building a Foundation

What is a covalent bond?

Hint: Think about how atoms interact with each other.

- ◯ A) A bond formed by the transfer of electrons
- ◯ B) A bond formed by the sharing of electron pairs between atoms
- ◯ C) A bond formed by the attraction between ions
- ◯ D) A bond formed by the sharing of protons

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

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- ☐ B) Double covalent bond
- ☐ C) Ionic bond
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List two characteristics of nonpolar covalent bonds.

Hint: Consider the distribution of charge in the bond.

1. Characteristic 1

2. Characteristic 2

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

Hint: Think about the theories related to molecular geometry.

- ◯ A) Quantum Theory

- ◯ B) VSEPR Theory
- ◯ C) Kinetic Molecular Theory
- ◯ D) Atomic Theory

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Part 2: Comprehension and Application

What determines the polarity of a covalent bond?

Hint: Consider the factors that influence electron distribution.

- ◯ A) The number of protons in the nucleus
- ◯ B) The difference in electronegativity between the bonded atoms
- ◯ C) The size of the atoms
- ◯ D) The temperature of the environment

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Hint: Consider the properties of the atoms involved.

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

Hint: Think about the properties and behaviors of covalent compounds.

- ☐ A) They conduct electricity in solid state.
- ☐ B) They have low melting and boiling points.
- ☐ C) They are often soluble in organic solvents.
- ☐ D) They are formed by the sharing of electrons.

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Hint: Consider the nature of covalent bonds and their structure.

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

Hint: Think about how lone pairs affect molecular geometry.

- ◯ A) Linear
- ◯ B) Bent
- ◯ C) Trigonal planar
- ◯ D) Tetrahedral

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Hint: Think about the arrangement of electron pairs around the central atom.

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- ◯ B) Bent
- ◯ C) Trigonal planar
- ◯ D) Tetrahedral

Identify the correct Lewis structure representations for water (H2O). (Select all that apply)

Hint: Consider the arrangement of atoms and lone pairs in the molecule.

- ☐ A) H-O-H with two lone pairs on oxygen
- ☐ B) H=O=H
- ☐ C) H-O-H with no lone pairs
- ☐ D) H-O-H with one lone pair on oxygen

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Draw the Lewis structure for carbon dioxide (CO2) and describe its molecular geometry.

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Hint: Consider the arrangement of atoms and the types of bonds present.

Part 3: Analysis, Evaluation, and Creation

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

Hint: Consider the electronegativity of the atoms involved.

- ◯ A) HCl
- ◯ B) O2
- ◯ C) NH3
- ◯ D) H2O

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

Hint: Consider the electronegativity differences between atoms.

- ☐ A) CH4
- ☐ B) H2O
- ☐ C) CO2
- ☐ D) NH3

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Compare and contrast the properties of ionic and covalent compounds.

Hint: Think about their bonding characteristics and physical properties.

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Hint: Think about their bonding, structure, and behavior.

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)

Hint: Consider the valence electrons of the central atom.

- [ ] A) Carbon (C)
- [ ] B) Nitrogen (N)
- [ ] C) Oxygen (O)
- [ ] D) Silicon (Si)

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)

Hint: Think about the elements that can form four bonds.

- [ ] A) Carbon (C)
- [ ] B) Nitrogen (N)
- [ ] C) Oxygen (O)
- [ ] D) Silicon (Si)

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

Hint: Think about fields such as medicine, materials science, or environmental science.

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