The Tale of Four Electrons

An Extra Credit Assignment for Semester 2 - 2012

This is a creative writing assignment designed to help you consolidate your learning about bonding and answer questions such as:

1. How are ionic, metallic, and covalent bonds related?
2. How do variations in electron configurations across a period alter expected bonding? And
3. How do intermolecular forces depend on bond polarity?

- You must incorporate all 12 bonding concepts (Figure 1) and 15 bonding vocabulary words (Figure 2) in ways that demonstrate your understanding of chemical bonding.
- You will create a short story or an illustrated story book that incorporates what you have learned about bonding.

To simplify this process, I have provided you with a story line consisting of four parts (Figure 3).

**FIGURE 1: BONDING CONCEPTS**

1. Most atoms are chemically bonded to other atoms.
2. The three major types of chemical bonds are ionic, covalent, and metallic.
3. In general, atoms of metals bond ionically with atoms of nonmetals, atoms of metals bond metallically with each other, and atoms of nonmetals bond covalently with each other.
4. Atoms in molecules are joined by covalent bonds.
5. The octet rule states that many chemical compounds tend to form bonds so that each atom - by gaining, losing, or sharing electrons - shares or has eight electrons in its highest occupied energy level.
6. A single bond is covalent bond in which a pair of electrons is shared between two atoms. Covalent bonds with more than one pair of shared electrons are called multiple bonds.
7. Bonding with many molecules and ions can be indicated by a Lewis dot structure (or what is sometimes called an electron dot diagram).
8. An ionic compound is a network of positive and negative ions mutually attracted to one another.
9. Because of the strong attraction between positive and negative ions, ionic compounds tend to be harder and more brittle and higher boiling points than materials containing only covalently bonded atoms.
10. Polyatomic ions are charged groups of atoms held together by covalent bonds.
11. Metallic bonding is a type of chemical bonding that results from the attraction between metal atoms.
12. Metallic bonds result in compounds that are having high electrical conductivity, malleability, ductility, and luster.

**FIGURE 2: CHEMICAL BONDING VOCABULARY**

**Introduction:**

1. Chemical bond
2. Covalent bond
3. Ionic bond
4. Metallic bond
5. Nonpolar covalent bond
6. Polarity
7. Polar-covalent bond
8. Valence electron

**Covalent Bonding:**

9. Chemical formula
10. Double bond
11. Electron dot diagram
12. Lewis dot play
13. Molecular compound
14. Molecule
15. Octet rule
16. Single bond

**Ionic:**

17. Formula weight
18. Ionic compound
19. Polyatomic ion

**Metallic:**

20. Ductility
21. Electrical conductivity
22. Luster
23. Malleability

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**FIGURE 3: STORY LINE**

**Overview:** To consolidate your understanding of basic bonding principles, write a story about four electrons that start their lives in individual atoms, but end up in ionic, metallic, polar covalent, and non-polar covalent compounds. There should be four parts to your story.

**Part 1: Life before bonding**

1. Name each electron. The name should creatively reflect the bond type that electron will experience.
2. To start, each electron should reside on an atom appropriate for its eventual bonding.
3. For each electron, briefly describe its atom using atomic theory and describe the electron itself (which should be a valence electron).

**Part 2: The bonding experience**

1. Pick an appropriate atom to bond with your electron-containing atom to form an ionic, metallic, polar covalent and non-polar covalent compound.
2. For each bond type, describe the bond-forming process. Describe what your electron experiences as the bond is formed. You may use illustrations, but they cannot be the primary way used to describe the bonding process.

**Part 3: Results of bonding**

1. Have your electron describe (in his/her own words) the results of the bonding on both a molecular and everyday level. Make sure you describe the expected physical properties for each type of bond.

**Part 4: Discussion**

1. Imagine your four electrons meet for coffee at a local diner. Create a conversation comparing and contrasting their experiences.
Submit your work using Microsoft Word’s "bookmark" feature to highlight and bookmark all sentences related to a concept. Label the bookmarks with the concept number, as well. For example, Concept2 (three major types of bonding) should be labeled “Concept 2”. If your concept explanation appears in more than one place, bookmark each separately as ‘Concept2a’, ‘Concept2b’ and so on.

At least 15 of the vocabulary words listed must be incorporated in a way that shows you understand them. Credit will only be given for vocabulary words that are checked and included in the vocabulary word count on the grading sheet. The sentences related to your use of that word should be bookmarked using the Microsoft Word "bookmark" feature by highlighting the word in yellow. For stories, extra points (1/4 point per word) will be given for each properly used word beyond the 15 words.

Your final draft should be at least 4 pages long and not exceed 6 pages (Times New Roman, 12pt. font, 1” margins).

This EXTRA CREDIT ASSIGNMENT IS DUE BY THURSDAY, JUNE 7TH.

NO EXCEPTIONS – LATE EXTRA CREDIT WILL NEVER BE ACCEPTED!!!!!
GRADING SHEET:

1. Correct use of vocabulary words (35%)  ___________________
2. Correct explanation of bonding concepts (30%)  ___________________
3. Story line (20%)  ___________________
4. Creativity (15%)  ___________________

Total: ____/100 points

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7. Bonding with many molecules and ions can be indicated by a Lewis dot structure (or what is sometimes called an electron dot diagram).
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Vocabulary:

Total number of vocabulary terms used: ______/23

CHEMICAL BONDING VOCABULARY

**Highlight these words in yellow as they appear in your story!**

Introduction:

- Chemical bond
- Covalent bond
- Ionic bond
- Metallic bond
- Nonpolar covalent bond
- Polarity
- Polar-covalent bond
- Valence electron

Covalent Bonding:

- Chemical formula
- Double bond
- Electron dot diagram
- Lewis dot play
- Molecular compound
- Molecule
- Octet rule
- Single bond

Extra Credit:

Number of vocabulary terms over the requirement: ____ x ¼ = ___