**Covalent Compound Structure and Properties – ANSWERS**

1. How does the structure of covalent compounds differ from that of ionic compounds? Draw a diagram below to illustrate your answer.

**I’m not going to draw this out, but the main point of this question and the main point of the entire worksheet is that covalent compounds exist as molecules and that ionic compounds exist as a big lattice of alternating positive and negative ions. Unlike the long-term attractions between the ions in ionic compounds, the molecules in covalent compounds are not really attracted to one another, and the properties of covalent compounds reflects this general structure.**

1. Based on the structure of covalent vs. ionic compounds, why do covalent compounds tend to have much lower melting and boiling points than ionic compounds?

**Covalent compounds exist as molecules, while ionic compounds exist as a big lattice of alternating cations and anions. When ionic compounds melt, all of the ionic bonds in the lattice need to be broken, which requires a lot of energy. However, when covalent compounds melt, no bonds are broken and it requires only a very small amount of energy to pull the molecules away from one another. As a result, covalent compounds have much lower melting and boiling points than ionic compounds.**

1. Why don’t covalent compounds conduct electricity? If covalent compounds are, in fact, insulators, why would you be electrocuted if you showered with a toaster?

**In order for electricity to be conducted, you need to have either moving electrons (as is the case in metals) or moving ions (as is the case in ionic compounds when they either melt or dissolve). Because covalent compounds have neither, they don’t conduct electricity. As for why you’d be electrocuted if you showered with a toaster even though water is covalent, it’s because tap water has different minerals (which are ionic) dissolved in it.**

1. What’s a molecule? Define not just the term, but how molecules act differently than crystalline structures.

**A molecule is a group of atoms that are bound to one another and cause each other to get their full octet of electrons. Unlike ionic compounds, in which the cations and anions are alternating and stuck together in a big stable block, molecules don’t really interact with each other, and have only very weak attractions between them. This, and the resulting low amount of energy needed to separate molecules from one another, gives rise to the properties of covalent compounds.**