Lesson 4: Atoms forming molecular compounds

Objective: Students will be able to construct simple and extended models of molecules choosing correct sized materials (based on size of atom).

Learning goal: Compounds are made from different atoms, which combine with one another in various ways. Atoms can bond together to form simple structures (only a few atoms) and extended structures with many atoms bonded together.

Vocabulary: molecule, molecular compound, chemical bonds, chemical formula, subscript

Engage:

1. Students are given images of molecular structures of various molecules (ex. Graphite, diamond, salt, hydrocarbons, water, etc.) along with corresponding chemical formulas and names, and then asked to match the pictures with the correct labels. Students asked to give reasons for their choices and to record any differences in the images of different molecular structures. (Hopefully students see that the chemical formula (subscript) gives number of atoms of each element, molecules can be bonded in different ways, and molecules can be small or large depending on amount of atoms)
2. Students can record thoughts on handout or notebook

Explore:

3. Students, in pairs, are then asked to build models of other common compounds with simple structures and with extended structure.
4. Students fill out corresponding handout that lists the chemical formulas. Students use the subscripts to count the number of atoms in each molecule and make a drawing that shows the structure of the molecule.
5. Teacher checks off on student handout when groups have correctly modeled the compound.

Explain:

6. Teacher discusses with class how the different bonding and structures that atoms can make can allow for the elements in the periodic table to make all the substances in the universe.
7. Teacher shows images of extended structures of very large molecules for students to see how big molecules can be (hundreds of atoms)

Elaborate: (Optional information)

8. Molecules can also include single, double, and triple bonds to allow for even more substances to be made. Students can be asked to make compounds containing single, double, and triple bonds.
9. Teacher relates Lewis-dot diagrams to number of bonds an element will form. Students are given handout showing Lewis-dot diagrams for elements 1-20 and compare it to the handout showing electron configuration
10. Students make connection that the Lewis-dot diagrams show electrons in the outer most electron level (or valence electrons) and teacher points out that these are the electrons involved with bonding.
11. Teacher shows students that atoms will make bonds to ensure that they have a full electron shell.
12. Students are asked to make models of some simple molecules that will have double and triple bonds (Examples include: C_2H_4, C_2H_2, etc.

Evaluation:

13. Student models and handouts are used for evaluation.