Name: _____ Class: _____ Date: _____

Modeling Molecular and Ionic Compounds

Learner Outcomes:

- Assemble or draw simple models of molecular and ionic compounds

Key Terms:

Atom	Anion	Ionic compound
Molecule	Cation	Molecular compound
Ion	Polyatomic ion	Chemical formula

Background Information: Atoms are the building blocks of all matter. Atoms in different proportions and combinations make up compounds with different characteristics. To help scientists classify, categorize and characterize matter, all compounds are divided into two major types; ionic compounds and molecular compounds. Ionic compounds are formed when oppositely charged ions attract and form ionic bonds. Molecular compounds are formed when atoms share electrons, forming molecular bonds. The types of bonds formed are what give ionic and molecular compounds their unique characteristics.

Research Question: How do we use models to illustrate ionic and molecular compounds?

Materials:

Different colored marshmallows
Different sized marshmallows
Toothpicks
Felt pens

This investigation / activity has been adapted from:
Mah K, Martha J, McClelland L, et al. *Science in Action 9.* Toronto, ON: Addison Wesley.

Procedure:

1. Using the marshmallows provided to you, build the following molecules using:
    a. Large marshmallows to represent anions
    b. Small marshmallows to represent cations
    c. Toothpicks to represent the bonds between atoms / ions
    d. Different colored marshmallows to represent different atoms
2. Determine how you will represent the atom of each element (size, color, etc)
3. Build each model to show one balanced formula unit. You may need to use more than one type of atom "atom" to illustrate a balanced chemical formula. Record the compound name, formula, number of each element and diagram of your model for each.

Molecular Compounds

Select three of the following molecular compounds to model and complete the following chart to summarize your understanding of molecular chemical formulas and nomenclature.

Br_2 Cl_2 CCl_2 PF_3 SiO_2 SO_2

Ionic Compounds

Create three ionic compounds by selecting one metal and one non-metal from the following list.
*For the transition metals you can pick the ion charge you want to use for your compound.
** Be sure to select at least one with multiple ion charges.

Metal Choices	Non-metal Choices
Na	O
Ca	Cl
Fe*	N
Pb*	P

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Observations:

Molecular Compounds

Chemical Formula	Chemical Name	Number of each element present	Model Diagram

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Ionic Compounds:

Elements Selected with their ion charge		Number of each element present (remember to balance your charges)	Chemical Formula	Chemical Name	Model Diagram
Metal Ion	Non-Metal Ion				

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Analysis:

1. Could you tell from your models, which compounds were ionic and which were molecular? Explain.

2. How did the ionic compound models differ from the molecular compound models?

3. How were the ionic and molecular compound models similar?

Conclusion:

Extension:

1. Use your library and the internet to find out about other types of forces that create bonds between atoms. Prepare a visual presentation describing at least two of these forces.
2. Using your library or the internet, look up the structures of the compounds you made models for. How are the structures you found in your research similar to those you made in this activity? How are they different?
3. Find out how many sugar molecules would fit in one average sized marshmallow. Describe and explain how you found this out.

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