Name: _____ 5____

Build a Molecule Computer Sim

Learning Goals:

1. Describe the difference between a molecule name and chemical formula.
2. Distinguish between the coefficient and subscript in a chemical formula.
3. Use pictorial representations of molecules to generate chemical formulas.

Take 5 minutes and explore the sim!

First Tab

1. Make a molecule:
   a. How do you know you made a molecule? _____
   b. Write the molecule **name** of some molecules you made (ex. Water).

_____ _____
_____ _____
_____ _____

2. Molecule Names and Chemical Formulas:
   a. Compare the name and chemical formula for some molecules:

Molecule Name	Drawing	Chemical Formula

Teacher Tip 7/13/12 3:20 PM

Comment [1]: Class Discussion
Have students read and discuss goals.

Prompt
-Why might scientists want to use chemical formulas to represent when they are reading or writing about molecules?
-How do we use symbols to represent common things?

Teacher Tip 7/24/12 10:17 AM

Comment [2]: Possible student difficulty
If this is the first time that students are learning about *chemical formulas* and *molecule names*, they might confuse the two terms.
To address this:
Post the terms with an example somewhere visible so that students can refer to these new terms and begin to use them in class discussions.

Teacher Tip 7/24/12 10:18 AM

Comment [3]: Possible student difficulty
Students are tempted to use vocabulary such as "big number" and "little number" in discussions instead of *coefficient* and *subscript.*
To address this:
Post examples of chemical formulas with the coefficient and subscript labeled somewhere visible so that students can refer to these new terms and begin to use them in discussions.

Teacher Tip 7/24/12 10:18 AM

Comment [4]: Prompt
-What is a pictorial representation?
-How might this also be useful to scientists and to us as we are learning about chemical formulas?
-How have we used pictures (models) of things in class before to make sense out of science concepts?

Teacher Tip 7/13/12 8:58 PM

Comment [5]: Play time
Encourage students to try out all three tabs during free play.

Teacher Tip 7/13/12 3:17 PM

Comment [6]: Check for understanding
Have students go around and quickly share out their favorite name of a molecule that they have made with the class. This will help ensure that students are able to distinguish between a molecule name and a chemical formula. Challenge students to try to pronounce difficult molecule names and have fun with the fact that many of the names are really difficult to pronounce (and it's ok if students don't have the correct pronunciation at this point!).

Teacher Tip 7/24/12 10:19 AM

Comment [7]: Possible student difficulty
Students may be tempted to draw circles without indicating the chemical symbol.
To address this:
Prompt students to draw the molecule with the symbol in it. Being able to see the number of times a symbol occurs will help students to make connections between their drawing and the coefficients and subscripts within the chemical formula.

Second Tab

3. Make Many
   a. Fill all the collection boxes and then complete the questions for each Goal.

Goal: $4H_2$	
Draw it!	
What does the big '4' in $4H_2$ mean?	
What does the little '$_2$' in $4H_2$ mean?	

Goal: $2CO_2$	
Draw it!	
What does the big '2' in $2CO_2$ mean?	
What does the little '$_2$' in $2CO_2$ mean?	

Goal: $2O_2$	
Draw it!	
What does the big '2' in $2O_2$ mean?	
What does the little '$_2$' in $2O_2$ mean?	

Goal: $2NH_3$	
Draw it!	
What does the big '2' in $2NH_3$ mean?	
What does the little '$_3$' in $2NH_3$ mean?	

Third Tab Challenge

4. What's the biggest molecule you can make?
   a. Molecule Name: _____
   b. Chemical formula: _____

5. Can you make a molecule that can be broken into smaller molecules?
   a. Big molecule **name**: _____
   b. Big molecule **chemical formula**: _____
   c. Smaller molecule **names**: _____
   d. Smaller molecule **chemical formulas**: _____

Teacher Tip 7/24/12 10:20 AM

Comment [8]: Differentiation Opportunity
There are many collection kits that you can make, so set it up as a challenge to see how many collections each student can get. This a particularly helpful if you want certain students to be motivated to spend extra time in this tab practicing and making connections before moving on to the third tab.

Teacher Tip 7/24/12 10:20 AM

Comment [9]: Check for understanding
This table is the best spot to check if students are beginning to understand the difference between subscripts and coefficients. There will be a lot of "Oh, now I get it!" exclamations from the class as students begin to make sense of chemical formulas. However, because this is the last portion in the activity that students will be able to show their mastery of understanding chemical formulas, it is important that you talk students through misunderstandings or pair them with a partner that can explain how to connect pictorial representations to chemical formulas.

Teacher Tip 7/24/12 10:13 AM

Comment [10]: Check for understanding
Use this example or a similar example from a sim projected on the Smartboard to discuss writing and making meaning out of chemical formulas.

Prompt
-How many molecules are represented in this chemical formula? How do you know?
-I don't see a number after "N" so how do I know how many nitrogen atoms there are?
-How many hydrogen atoms are there in one molecule? How do I know?

Teacher Tip 7/24/12 10:13 AM

Comment [11]: Extension Opportunity
This tab is great for students who have already demonstrated mastery making meaning out of chemical formulas. However, this section is optional, so you might choose to spend more time on tab 2 with your students until they have achieved mastery of these concepts.