

### Lesson Plan Template

<b>Grade:</b> 6th	<b>Subject:</b> Physical Science
<b>Materials:</b> Dot candies, toothpicks, molecule fact sheets and examples	<b>Technology Needed:</b> Projector
<b>Instructional Strategies:</b> <input type="checkbox"/> <b>Direct instruction</b> <input type="checkbox"/> Guided practice <input type="checkbox"/> Socratic Seminar <input type="checkbox"/> Learning Centers <input type="checkbox"/> Lecture <input type="checkbox"/> Technology integration <input type="checkbox"/> Other (list) <div style="margin-left: 200px;"> <input type="checkbox"/> Peer teaching/collaboration/<b>cooperative learning</b>  <input type="checkbox"/> Visuals/Graphic organizers  <input type="checkbox"/> PBL  <input type="checkbox"/> Discussion/Debate  <input type="checkbox"/> Modeling         </div>	<b>Guided Practices and Concrete Application:</b> <input type="checkbox"/> Large group activity <input type="checkbox"/> Independent activity <input type="checkbox"/> <b>Pairing/collaboration</b> <input type="checkbox"/> Simulations/Scenarios <input type="checkbox"/> Other (list) <b>Explain:</b>  Students will be put into lab groups and rotating through 4 different lab stations to build molecules. <div style="margin-left: 200px;"> <input type="checkbox"/> <b>Hands-on</b>  <input type="checkbox"/> Technology integration  <input type="checkbox"/> Imitation/Repeat/Mimic           </div>
<b>Standard(s)-</b> Performance Standard MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures.	<b>Differentiation</b>  <b>Below Proficiency:</b>  Students will have developed models to describe the atomic composition of simple molecules with the help of their peers and teacher and using the picture of the molecule as reference.  <b>Above Proficiency:</b>  Students will have developed models to describe the atomic composition of simple molecules because they understand the number of bonds each element can have. These students will be able to assist their peers and lead students who are below proficiency. Students above proficiency will also be able to be challenged at the glucose building station.  <b>Approaching/Emerging Proficiency:</b>  Students approaching proficiency will be able to develop models to describe the composition of simple molecules with the help of their peers and minimal reference to the molecule picture.
<b>Objective(s)</b> By the end of this lesson, students will have developed models to describe the atomic composition of simple molecules demonstrating their understanding of simple chemical formulas and an element's ability to bond.  <b>Bloom's Taxonomy Cognitive Level:</b>  Create	(This content is merged into the Differentiation section above for better readability and flow.)
<b>Classroom Management- (grouping(s), movement/transitions, etc.)</b> Students will be placed in their quarterly lab groups. They will rotate through the lab stations as stations become available.	<b>Behavior Expectations- (systems, strategies, procedures specific to the lesson, rules and expectations, etc.)</b> Students will be expected to follow the lab contract that states they will be respectful, responsible, and safe when using lab equipment. Students are also expected to stay on task and use their time wisely when they are waiting on a lab station to be open.
<b>Minutes</b>	<b>Procedures</b>
<b>10</b>	<b>Set-up/Prep:</b> Each of the five lab stations will need to be set up in the following way (SEE ATTACHED FIGURES): Station One (Ammonia): Example of ammonia, dots candy, toothpicks, ammonia fact sheet, ammonia question sheet, and ammonia molecule key. Station Two (Hydrogen Peroxide): Example of hydrogen peroxide, dots candy, toothpicks, hydrogen peroxide fact sheet, hydrogen peroxide question sheet, and hydrogen peroxide molecule key. Station Three (Water): Example of water (water bottle), dots candy, toothpicks, water fact sheet, water question sheet, and water molecule key. Station Four (Calcium Carbonate): Example of calcium carbonate (chalk, egg, limestone), dots candy, toothpicks, calcium carbonate fact sheet, calcium carbonate question sheet, and calcium carbonate molecule key.

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	Station Five & Six (Glucose): Example of glucose (granulated sugar), dots candy, toothpicks, glucose fact sheet, glucose question sheet, and glucose molecule key.	
2	<b>Engage: (opening activity/ anticipatory Set – access prior learning / stimulate interest /generate questions, etc.)</b> Today is lab day! Yesterday we learned about molecules and now you are going to have a chance to build molecules in lab groups!	
7	<b>Explain: (concepts, procedures, vocabulary, etc.)</b> Explain the lab write up that each lab group will have. Each person in the lab group must write in a different colored writing utensil and there must be a key that explains which color goes to which student so that the teacher can see who did what during labs. Review the number of bonds each atom can make and put this key on the projector so students can reference it during the lab time. (SEE ATTACHED FIGURE)	
25	<b>Explore: (independent, concrete practice/application with relevant learning task -connections from content to real-life experiences, reflective questions- probing or clarifying questions)</b>  Students will take turns rotating through the lab station with their lab groups. They will need to do the following at each station (SEE ATTACHED FIGURE): <ol style="list-style-type: none"> <li>1. Draw a picture of what that substance looks like in everyday life</li> <li>2. Write the chemical formula and molecule name</li> <li>3. Highlight the elements found in the molecule on the periodic table</li> <li>4. Answer three questions from the question sheet</li> <li>5. Draw a model of the molecule</li> </ol> When students are waiting for a lab station to open up, they should be working at their desks on the molecule simulation ( <a href="https://phet.colorado.edu/en/simulation/build-a-molecule">https://phet.colorado.edu/en/simulation/build-a-molecule</a> ) and/or missing work.	
2	<b>Review (wrap up and transition to next activity):</b> Clean up personal materials, have one group member keep their lab write-up in a safe place until tomorrow when they can finish the lab.	
	<b>Formative Assessment: (linked to objectives)</b> <b>Progress monitoring throughout lesson- clarifying questions, check- in strategies, etc.</b>  I will use proximity and check-ins to observe group work and monitor understanding throughout the lab time.	<b>Summative Assessment (linked back to objectives)</b>  There will be a summative assessment later next week that will demonstrate the students’ knowledge and ability to read a chemical formula and draw a molecule based on that chemical formula.   <b>If applicable- overall unit, chapter, concept, etc.:</b>
	<b>Reflection (What went well? What did the students learn? How do you know? What changes would you make?):</b>  Overall, the lab went well. Students worked well in their groups and using the different colored markers encouraged all students to participate. The design of the lab also really encouraged students to discover the shape of the molecules with only knowing the number of bonds each element can have.  I went a little too quickly through the lab instructions and had to compensate by re-explaining details to groups individually as I walked around.	

# Lesson Plan Template

Lab Set Up:

Station One: Ammonia

**Ammonia**

Make a scientific model and then draw it on your answer sheet.

Supplies:  $NH_3$

Yellow Gumdrop Candy      White (or similar color) Gumdrop Candy      3 toothpicks

KEY:  
Yellow - Hydrogen  
White - Nitrogen

AFTER you build your model, lift the paper below to check.

74551

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**Ammonia**

Fact Sheet

Ammonia is a compound of the elements Nitrogen and Hydrogen. It is a colorless, strong-smelling gas. When purchased for home cleaning, it is sold in a liquid form consisting of a solution of  $NH_3$  in water. This is called Ammonium hydroxide and is a popular cleaning agent because it often leaves a streak-free shine (perfect for cleaning windows). If accidentally mixed with any product containing bleach, a poisonous gas will result, so be very careful NOT to mix ammonia and any other cleaning agents! Ammonia is produced in a chemical plant using a process where Nitrogen from the air is combined with Hydrogen using high pressure.

Other facts to consider:

The most popular use of this molecule is for fertilizing crops, particularly corn and wheat. It can be used as a fuel for powering rockets, although it is not as powerful as other fuels. Ammonia is used to treat E.Coli in beef products. It is also used as a refrigerant in ice hockey rinks.

Take it further: Extend your learning by visiting this QR to answer a bonus question!

Bonus: Look at the pie graph on this website. Which use accounts for the most man made ammonia in North America?

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**Ammonia**

1. People who use this molecule for household cleaning should be aware of what dangerous property? (Be as specific as possible!)

2. Describe a use for ammonia that you did not know about before reading the fact sheet.

3. What questions do you have about Ammonia? What are you curious about after learning about this molecule?

Bonus Question Answer:

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# Lesson Plan Template

## Station 2: Hydrogen Peroxide

**Hydrogen Peroxide**  
Make a scientific model and then draw it on your answer sheet.

Supplies:  $H_2O_2$

Red Gumdrop Candy  
Yellow Gumdrop Candy  
3 toothpicks

KEY:  
Yellow = Hydrogen  
Red = Oxygen

AFTER you build your model, lift the paper below to check your work!

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**Hydrogen Peroxide**  
Fact Sheet

Made from a combination of hydrogen and oxygen ( $H_2O_2$ ), hydrogen peroxide has a variety of uses in our everyday lives. Simply stated, it is water with an extra oxygen molecule. Slightly acidic and a bit more viscous than water, this compound is often associated with disinfecting minor cuts and scrapes. In addition to this popular use of diluted hydrogen peroxide, it is also used in products that bleach body and facial hair. Its bleaching properties are also used with textiles in industry and are often preferred over chlorine bleach because peroxide is more gentle on fabric and leaves less residue. It is used to bleach cotton, straw, ground wood pulp, and paper among other things.

Other facts to consider:  
Hydrogen peroxide was once used to restore old paintings by removing sulfur from their surfaces. It was also used during WWII in rocket fuel and torpedoes. This compound was discovered in 1818 by Louis Jacque Thenard.

Take it further: Extend your learning by visiting this QR to answer a bonus question!

Bonus: What is the catalyst in the reaction that occurs in this cool hydrogen peroxide trick?

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**Hydrogen Peroxide**

1. Why is this compound often preferred over other bleaching agents?  
QR
2. Name two household uses for hydrogen peroxide.  
QR
3. How was this compound used during WWII?  
QR

Bonus Question Answer:  
QR

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# Lesson Plan Template

## Station 3: Water

**Water**  
Fact Sheet

Water is formed when one Oxygen atom bonds with two Hydrogen atoms. This compound covers nearly 70 percent of Earth, and is essential for all living things on the planet. On average, it accounts for 65% of the human body! Occurring naturally in all three phases (solid, liquid, gas) this compound is responsible for an ever-flowing water cycle in which water moves through the Earth's soil and air. Water has a high heat capacity, which allows it to hold its temperature well, and thereby buffer large, rapid changes in temperature. (The water in lakes and oceans help regulate climate on Earth.) Water is also responsible for rainbows and acts like a prism as light passes through each drop. Water is more dense when heated and less dense when frozen, which causes ice to float. Water is also known as the "universal solvent" because more substances dissolve in it than any other chemicals.

Other facts to consider:  
Water can be separated into H and O using electricity. The formula for water is H<sub>2</sub>O.

Take it further: Extend your learning by visiting this QR to answer a bonus question!

Bonus: According to the pie chart, what household use accounts for the most consumption of water?

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**Water**

1. How much of Earth is water?  
QR

2. Water has a high heat capacity.  
How does this impact life on Earth?  
QR

3. Why does ice float on water?  
QR

Bonus Question Answer:  
QR

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**Water**

Make a scientific model and then draw it on your answer sheet.

Supplies: H<sub>2</sub>O

Red Gummy Candy    1/2 Yellow Gummy Candy    2 Toothpicks

KEY:  
Yellow = Hydrogen  
Red = Oxygen

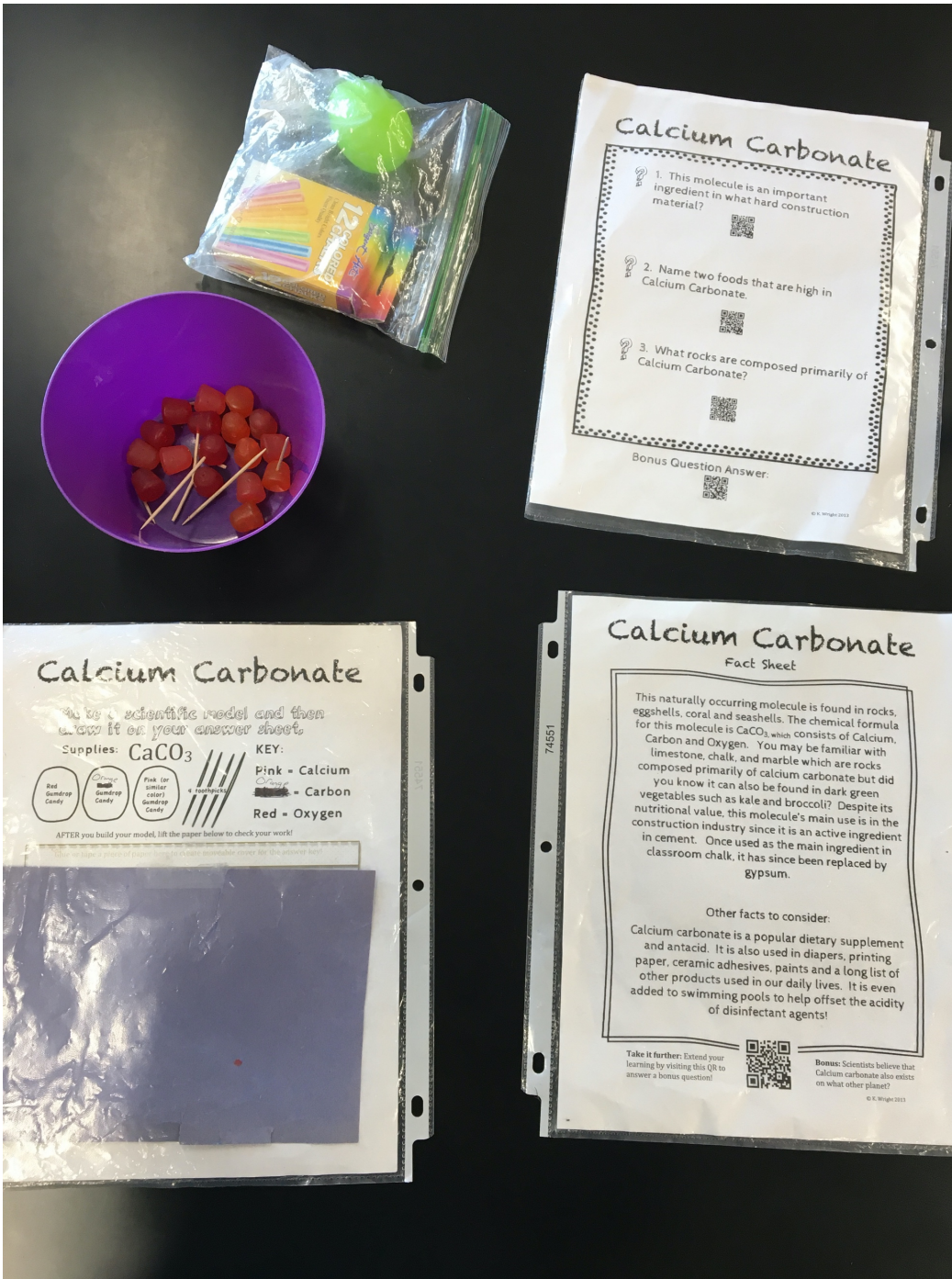
AFTER you build your model, lift the paper below to check your work!

Slide in here a piece of paper here to create an invisible cover for the answer key!

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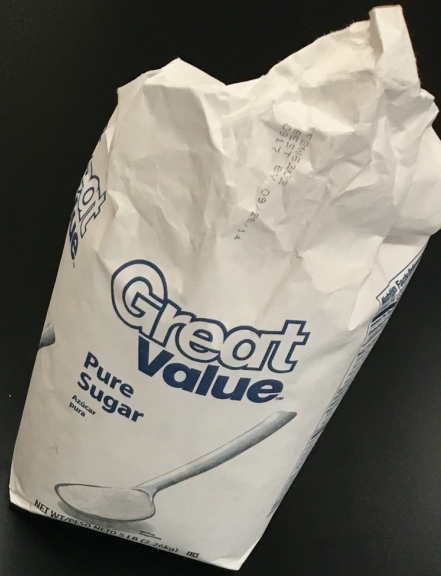
# Lesson Plan Template

## Station 4: Calcium Carbonate



# Lesson Plan Template

## Station 5 and 6: Glucose



### Glucose

Fact Sheet

This molecule is composed of Carbon, Hydrogen and Oxygen. It is created naturally through the process of photosynthesis whereby plants absorb light energy, water and carbon dioxide yielding oxygen and glucose. This glucose is the main source of energy for the plant and a building block for its growth. Did you know glucose is responsible for those dark red and purple leaves we see during the fall season? As it gets cooler, plants slow their photosynthesizing and lose their green chlorophyll color. This allows for other colors to shine through!

Glucose is a carbohydrate and is a main source of energy for humans! We consume it in a variety of plant-based foods such as fruits, honey and vegetables. Our bodies oxidize glucose through a process called metabolism, which produces energy that our cells need for survival.

Other facts to consider:  
The formula for glucose is  $C_6H_{12}O_6$

Take it further: Extend your learning by visiting this QR to answer a bonus question!

Bonus: How many atoms are in one molecule of glucose? How many of each element? How many molecules are in one mole of glucose? How many grams are in one mole of glucose? How many molecules are in one liter of glucose? How many molecules are in one cup of glucose?

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### Glucose

- How is glucose created in nature?
- Name two natural foods that are likely high in glucose.
- What is the name of the process our body uses to process glucose into usable energy?

Bonus Question Answer:

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### Glucose

Make a scientific model and then draw it on your answer sheet.

Supplies:  $C_6H_{12}O_6$

Orange Gumdrops Candy  
Red Gumdrops Candy  
Green Gumdrops Candy  
24 Toothpicks

KEY:  
Green = Hydrogen  
Orange = Carbon  
Red = Oxygen

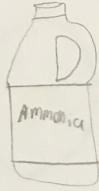
AFTER you build your model, lift the paper below to check your work!

# Lesson Plan Template

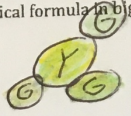
Example of Students' Work/Lab Write Up:

Calligh      madison      Haylee.T      Malayna

Draw a picture of what this substance looks like in your everyday life.



Write the chemical formula in big, bold letters and numbers!

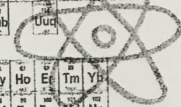


Molecule Name Ammonia

Highlight ONLY the elements on this Periodic Table that are included in this molecule.

H	He																
Li	Be	B	C	N	O	F	Ne										
Na	Mg	Al	Si	P	S	Cl	Ar										
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No		

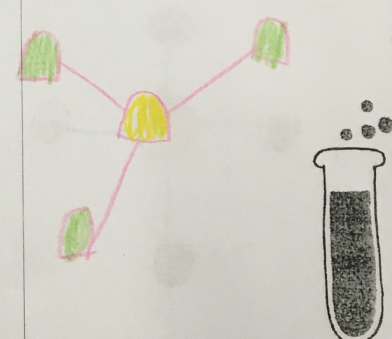
\*Lanthanide series  
\*\*Actinide series



? Mixed with ammonia with another cleaning product it can become a poisonous gas  
2. it's good for cleaning windows  
3. why does it smell like that

?

Draw a scientific MODEL of this molecule. Be sure to label each element and to color code them correctly!



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# Lesson Plan Template

Number of Bonds Reference:

## Periodic Table and Reactivity

