Remote Learning Activities

SCIENCE 7 & 8
Part 3
Science Grades 7 & 8 Remote Learning Activities

Below is a list of activities that students can work on during the unexpected closure of schools. Activities are designed to reinforce the learning already facilitated to students during the 2019-2020 Academic School Year. This Remote Learning Activity Packet was created for ten (10) days of independent practice.

The content focus is as follows:

<table>
<thead>
<tr>
<th>Activity Number</th>
<th>Content Focus</th>
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| Activity #1     | Read “Chemistry”  
                    Complete questions at the end of the reading. |
| Activity #2     | Read “The Periodic Table: A Closer Look”  
                    Complete the review questions at the end. |
| Activity #3     | Read “Stack’Em Up”  
                    Complete the review questions at the end. |
| Activity #4     | Read “Getting to Know: Atoms and Elements.”  
                    Complete the review questions at the end. |
| Activity #5     | Read “Atoms and Molecules”  
                    Complete the review questions at the end. |
| Activity #6     | Read “Subatomic Particles”  
                    Complete the review questions at the end. |
| Activity #7     | Read Molecules That Matter”  
                    Complete the review questions at the end. |
| Activity #8     | Read “Chemical Reactions”  
                    Complete the review questions at the end, and a Claim-Evidence-Reasoning Statement about chemical reactions. |
| Activity #9     | Read “What’s Cooking?”  
                    Complete the review questions at the end. |
| Activity #10    | Read “Chemistry in an Apple Pie”  
                    Complete the review questions at the end. |
What are chemical reactions?
Chemical reactions are changes that occur when atoms, ions, or molecules interact. Let’s look at a simple example: rust. Rust forms when iron reacts with oxygen. Rust is a new substance that is different from either of the two substances that formed it. Think of a rusty object you’ve seen. Where was it? Most likely, the object was exposed to plenty of air, which contains oxygen. Iron reacted with this oxygen to form rust. This process is known as oxidation, and it’s a very common chemical reaction.

Why do chemical reactions occur?
Chemical reactions occur because atoms can lose, gain, or share electrons. The outer shell of electrons, called the valence shell, has a tendency to fill with a total of eight electrons. If an atom has only seven electrons in its outer shell, it is likely to gain an electron. An atom with only one electron in its outer shell has a tendency to lose that electron. This tendency of atoms to fill their outer shells with eight electrons is called the octet rule. The octet rule demonstrates the trading of electrons that tends to occur between atoms.

In a chemical reaction, the starting substances (the reactants) are different than the ending substances (the products). In the example above, the reactants are iron and oxygen, and the product is rust.

Are there different types of chemical reactions?
The short answer is yes. But let’s explain this topic a bit more. There are at least four different types of chemical reactions, although some scientists list more types. One type is a synthesis reaction. The rust example is a synthesis example. Two different reactants create one product. A second type of chemical reaction is a decomposition reaction. During a decomposition reaction, one reactant breaks down into two or more products. Water can undergo a reaction in which it breaks down into hydrogen gas and oxygen gas.
A third type of reaction is the single replacement reaction. In this reaction, one element replaces another. A simple equation describes the changes that take place:

\[ A + BC \rightarrow B + AC \]

The element \( A \) reacts with the compound \( BC \). \( A \) replaces \( B \) in the compound, forming the new compound \( AC \). The element \( B \) is the other product.

A fourth type of chemical reaction is a double replacement reaction. In this reaction, two compounds react to form two new compounds. The following equation shows the changes taking place:

\[ AB + CD \rightarrow CB + AD \]

Compare the products to the reactants to see how the elements \( A \) and \( C \) change places. \( CB \) replaces \( AB \). \( AD \) replaces \( CD \). Two new compounds replace the starting two compounds in this reaction.

**What are common signs of chemical reactions?**

Several indicators are often used as evidence of a chemical reaction: the production of gas bubbles or a precipitate, temperature changes, the production of light, and a change of color or odor. In some reactions, the temperature rises; these are known as **exothermic** reactions. Reactions in which the temperature drops are called **endothermic** reactions. Don't expect all reactions to produce all of these indicators. In fact, some chemical reactions don't show any indication of reaction at all.

**What are some common chemical reactions?**

Rusting is an example of a common chemical reaction. So is a burning candle. Another reaction you may have seen is the one used in volcano models. Vinegar and baking soda are combined to simulate an eruption. The eruption happens because carbon dioxide gas is formed and released.

Chemical reactions occur all the time—in cars, in appliances, in household and beauty products, and within our bodies.
Day 8: Chemical Reactions

After reading the article, Chemical Reactions, use evidence from the text to answer the following questions.

1. What are chemical reactions?

2. Why do chemical reactions occur?

3. What are the different types of chemical reactions?

4. What are common signs of chemical reactions?

5. What are some common chemical reactions?
Claim- Evidence-Reasoning

How would you know if a chemical reaction occurred? Develop a claim-evidence-reasoning to support that a chemical action occurred.

Claim:

Evidence:

Reason:
What's Cooking?

Glad you asked—a lot of it is chemistry. Chemical and physical changes happen all the time in the kitchen. Some chemical changes, like dissolving yeast in a mixture of sugar and water, give off heat. Others take heat rather than release it. Take a look and see what's really going on while you're working in the kitchen.

Fruit Facts

Compare the texture of a crisp apple to applesauce. Quite a difference when you consider that all you did was add a little water and turn on the heat. The heat breaks down the raw fruit's cell structure and releases water. The substances holding the cells together are also affected by the heat. They are converted to pectin and combine with the water. The result is smooth applesauce.

Better Baking

To make gingerbread, you start by mixing together flour, sugar, spices, and a little baking soda. The mixture contains separate ingredients, but no chemical reaction has yet occurred. When you stir in the liquid—molasses, buttermilk, or lemon juice—the chemical changes start. That little bit of baking soda reacts with the liquid to produce a light, airy cake.

Here's how it works: When the baking soda, a base, and the acidic liquid combine, the bitter taste of the baking soda is neutralized; carbon dioxide gas and heat are released, forming bubbles in the batter. (To learn more about acids and bases, turn to the Almanac, pages 12–13.) In the hot oven, the bubbles get bigger, making the batter rise. As the batter becomes cake-like, the bubbles can't expand any more so the carbon dioxide floats into the air, leaving behind a delicious dessert.
**Don’t Make Me Cry**

If you don’t like onions, it may be because they make you cry. An onion contains two substances, sulfoxides and allinase; when they’re combined, they cause tears. In a whole onion, the two substances are kept separate by cell walls, but the physical change of slicing the onion cuts through the walls and allows the two substances to mix and form a new substance. Some of the new substance floats up to your eyes and reacts with the tears. The combination of tears and the new substance forms an acid. That’s what stings your eyes and makes you cry.

**Put Freezer Burn on Ice**

What are those leathery white blotches you sometimes see on frozen meat? Some are ice that forms when water in the meat freezes—a physical change. But the greenish-gray crystals tell a different story. Freezing concentrates many of the chemical ingredients in food at the surface. As they react with each other and air, they can cause this unpleasant result.

**Rising to the Occasion**

Bread needs air bubbles, too. And it’s the yeast that usually makes them happen. A one-celled fungus, yeast feeds on sugars in the bread dough, converting the sugar to carbon dioxide and alcohol. This conversion is a chemical reaction that makes bread rise. The carbon dioxide forms bubbles. As the bubbles grow, the other ingredients move to make room for them. This reaction releases heat, but heat also helps the process along. Yeast performs best in a warm environment, about 80°–95°F. By the time the bread goes into the oven, the carbon dioxide has done its work, and the dough is nice and puffy. But what happens to the yeast? It dies at temperatures of about 140°F and higher. And the alcohol? It evaporates. All you’re left with is a luscious loaf of homemade bread.

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**Activity**

**Shell Game** There’s more than one way to crack an egg shell. Ask your parents for two eggs. Place them in two clean one-pint or larger jars with lids. Be careful not to crack the eggs. Add enough cold water to one jar to cover the egg by about an inch. To the other jar, add the same amount of white vinegar. Place the lids on the jars. Do you notice anything happening? Write down what you see. Leave the jars in place for 24 hours, but take a look from time to time and write down what you observe. After 24 hours, compare the eggs. What differences do you observe? What do you think caused any differences? Note: Discard both eggs at the end of this experiment. They may contain harmful bacteria. Be sure to wash your hands thoroughly after touching the eggs.
Day 9: What’s Cooking?

After reading the article, *What’s Cooking*, use evidence from the text to answer the following questions.

1. The article provides examples of chemical changes that take place during cooking. Explain why they are chemical changes and not physical changes.
Day 10: Chemistry in an Apple Pie

After reading the article, Chemistry in an Apple Pie, use evidence from the text to answer the following questions.

1. The article provides examples of chemical changes that take place when baking an apple pie. As you prepare to make the apple pie, when could you stop and separate the ingredients? Explain why.
Apples are a healthy snack. Inside apples, chemical compounds create the sweet taste and soft texture of the apple. When apples are left in the air, chemical reactions occur, turning the apple brown. Why do apples turn brown when exposed to air?

The compounds in apples readily combine with air molecules. A compound is a unique chemical structure formed when atoms and molecules combine to form a new substance. The atoms and molecules that make up a compound have different properties from the compound itself.

Chemical bonds hold molecules together. Energy is required to break the bonds between atoms and molecules. Some compounds, such as common table salt, break apart easily. In other compounds, the bonds are much stronger. Because compounds are so small, scientists use models to represent the bonding between the atoms and molecules.

A chemical formula is a shorthand way to represent the number of atoms and molecules inside a compound. Any time you see a chemical formula containing more than one element, you are looking at a chemical compound. The chemical formula for common table salt is NaCl. This means that each molecule of table salt contains one atom of sodium (Na) bonded to one atom of chlorine (Cl).

Salt dissolves in solutions such as water. Water is a compound with the chemical formula H₂O. This means that each molecule of water contains two atoms of hydrogen (H) bonded to one atom of oxygen (O).

Compounds are different than mixtures. A mixture contains substances that are not chemically bonded together. If you want to bake an apple pie, you must first gather and combine the ingredients. Sugar, apples, and pie dough combine to form a mixture. If you really wanted to separate this mixture, you could. Once you apply energy in the
form of heat to the apple pie mixture, however, chemical changes occur that form new compounds.

Some of the elements that make up compounds are very important to life on Earth. For example, many chemical compounds contain carbon. Your entire body is made of many carbon-based compounds known as organic compounds. Some organic molecules are very complex.

Another important element in compounds is oxygen. Oxygen in the air is important for life. Oxygen exists as a diatomic molecule with the formula O₂. Diatomic molecules form when two or more of the same element combine chemically to form a molecule. Oxygen causes oxidation. Chemical compounds undergo oxidation when oxygen combines with other atoms or compounds.

If we return to the example of the apple, the compounds in the apple undergo changes in the presence of oxygen. Reactions with oxygen in the air cause new chemical compounds to form, turning the apple brown. A similar process forms rust on metal. Rust is a compound with the formula Fe₂O₃. Rust happens when iron atoms (Fe) in metal gain oxygen atoms (O) to form a reddish substance.