

Chemistry All Around Us - Week 5

Day 3: Exploring Gases

Teacher/Parent Background:

In science, the “stuff” that everything is made of is called matter. You can use your senses to detect matter. You can feel the shape and roughness of a rock. You can taste the juice of an orange. You can smell popcorn. You can see a crowd at a ball game. The characteristics of matter that we can observe with our senses are called properties. No two substances have exactly the same set of properties. The properties of matter can help us categorize (sort/group) matter.

Overview:

In this activity, young learners will use their senses of touch and sight to explore the various observable properties (characteristics) of different types of matter. They will then use their observations to make decisions about how to define a specific category of matter - gases.

Related Standards:

- **Plan and carry out an investigation** to determine that matter has mass, takes up space, and is recognized by its observable properties; use the collected evidence to **develop and support an explanation**.

Key Terms:

- matter - the “stuff” that everything is made of
- properties - characteristics of a substance
- senses - touch, taste, hear, smell, see
- solid - a state of matter in which the substance has a definite shape and a definite volume
- liquid - a state of matter in which the substance has a definite volume but not a definite shape. It takes the shape of its container.
- gas - a state of matter in which the substance takes the shape and volume of its container

Materials List:

- A variety of different types of matter from Day 1:
 - Solids - crayons, books, pencils, pebbles, toys, balls, etc.
 - Liquids - water, shampoo, hand soap, milk, etc.

- Gases - filled balloon or sandwich bag, football, basketball, etc.

Activity Description:

1. Revisit the types of matter that the student sorted during Day 1.
 - This week, you have been sorting different types of matter (objects) into groups or categories. How did you decide which objects to group together?
 - We discussed that matter which has a definite shape (round, square, etc.) is called a solid. Which objects in your sort are solids?
 - We also discovered that some types of matter are liquids. Which objects are liquids?
2. Remind the student that one of the other categories that scientists use to describe matter is gases. Prompt the student to begin exploring his/her remaining objects and categories to determine which properties all the objects have in common.
 - Note: Do not define the term "gases" at this time. Allow the student to formulate his/her own ideas. Additionally, depending on the objects used, the student may have sorted balloons, basketballs, etc. into the solid category based on the observable outside of the object.
3. Once the student has identified which matter (objects) he/she thinks are gases, discuss his/her reasoning:
 - Why do you think these objects are gases?
 - How are they different from solids?
 - How are they the same as solids?
 - How are they different from liquids?
 - How are they the same as liquids?

Closure:

Explain that matter that is sorted in the gas category does not have its own shape or volume, meaning it takes up the space and shape of the container it is placed in. Discuss with the student:

- If a gas does not take up its own space or have its own shape, which category in your sort contains gases? Why do you think so?
- Are their objects in other categories that might also be gases? Why or why not?
- Would you like to change how you sorted any objects? Why or why not?
 - Prompt student to make any changes in his/her sort at this time.

Extension:

The concept of gases as a state of matter can be difficult for younger students as gases are invisible to the eye. To further support the student's understanding

of gases, provide numerous opportunity for the student to explore gases and their effects on other types of matter:

- Blow up a balloon with exaggerated, big breaths. Ask the student, “**What is happening to the balloon?**” If needed, prompt with additional questions, “**Why is it getting bigger? What am I putting into the balloon?**” The student may say you’re blowing your breath into it or you’re blowing air. Explain that air is a type of gas. We can’t see it except when we capture it in a container, like a balloon, which changes shape as more gas is added.
- Give the student a straw and a feather. Encourage the student to use only gas to move the feather.
- Place a cotton ball into the neck of an empty 2-liter bottle. Prompt the student to squeeze the bottle quickly. The cotton ball will pop out. Discuss with the student why the cotton ball was forced out of the bottle - gas!
- Demonstrate or show videos on how different sports equipment is inflated using a pump (football, soccer ball, bicycle tire, etc.).

Once the student has had ample time to explore, provide one final opportunity to re-sort any items.

- **I see you move (object) from (category) to (category). Why?**
- **Are there some items that belong in more than one category? Why?**