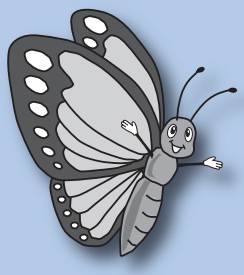
Does Clear Air = Clean Air?

ACTIVITY 4



Learning Objectives:

- Demonstrate how human actions impact the air around us.
- Identify pollutants created by different human actions.

Subject

- Science

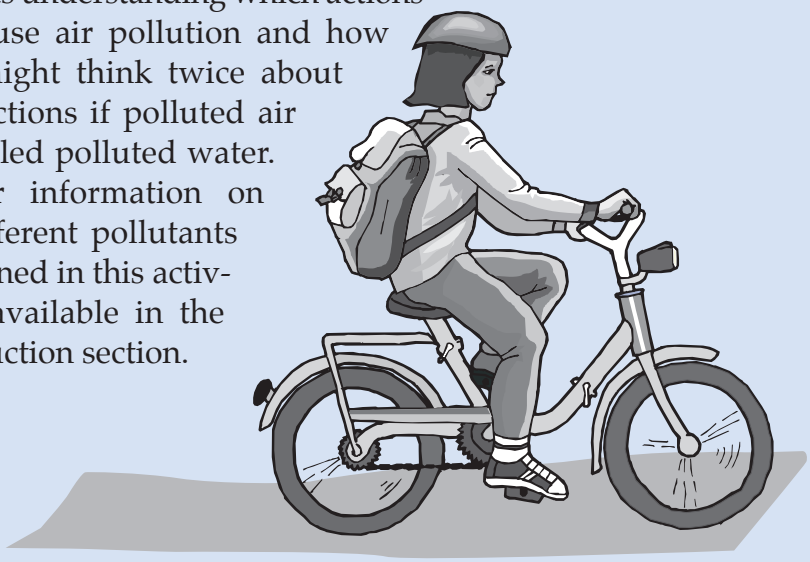
Materials

- One clear glass or plastic cup
- Water
- Mixture ingredients (see example on next page)
- Spoon
- Does Clear Air = Clean Air? student worksheet

Teacher's Background Information

Air pollution is sometimes a difficult topic to grasp because many times it is not visible. The goal of this activity is to help students understand that just because they might not be able to see air pollution does not mean it is not there. Prior to starting the activity you may want to have a brief discussion about air pollution and its causes. You may even want to determine the major source of energy for your area (coal, oil, natural gas, etc.). About 75 percent of Wisconsin's electric energy comes from coal, oil, and natural gas.

After the initial discussion on air pollution, have the students make a list of all the ways they use energy from the time they wake up to the time they get to school. Then have them fill out the Student Checklist based on their actions. The focus of the activity should not be on the specific type of pollutants (CO, CO_2, etc.) produced, but rather on the students understanding which actions can cause air pollution and how they might think twice about their actions if polluted air resembled polluted water. Further information on the different pollutants mentioned in this activity is available in the Introduction section.



Does Clear Air = Clean Air?

Prior to starting the activity, assign a mixture ingredient for each pollutant listed in the Pollutant Table and share the ingredient list with your students. You can use whatever you have readily available. It is fun to use things that when combined create a very visually interesting result. Here's an example:

Pollutant:	Mixture Ingredient:
CO	Chocolate syrup
CO_2	Vegetable oil
Particle Pollution	Coffee grounds
NOx	Drink mix powder
SO_2	Dark colored soda
VOCs	Honey
Toxins	Ketchup

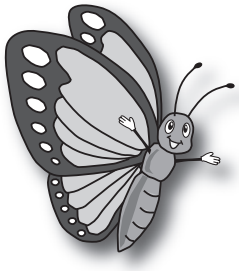
Now have the students add all the pollutants they produced to their cup of water. Discuss the Follow Up Questions as a group or have the students answer them independently.

Remember:

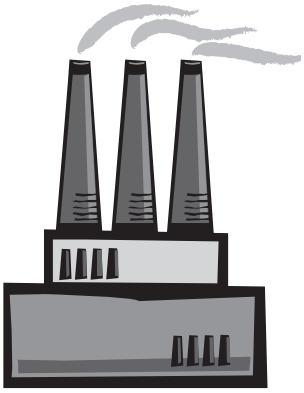
- Teachers, please remember to post or make available the **bold-faced** vocabulary word definitions in each activity *(see the glossary on page 65 for definitions).*

Name _____ Date _____

Does Clear Air = Clean Air?



How can you tell when the air outside is clean or dirty? Although there are days where you can actually see dirty air, most of the time we cannot tell by looking outside whether our air is clean or dirty. When harmful amounts of gases, dust, or fumes are released into the air it's called **air pollution**.



So where does air pollution come from? Unfortunately, most of the time humans are the main cause of air pollution. When we use any kind of electrical gadget (like a hairdryer, microwave, toaster, computer, or cell phone) the energy needed to make it work comes from a **power plant** to our house. Most of the power plants in Wisconsin use coal, oil, or natural gas to produce electricity. Producing electricity can cause quite a bit of air pollution. The more energy we use, the more the power plant has to produce and the more air pollution is created.

Electrical items are not the only things that create air pollution – things like lawn mowers, cars and trucks, leaf blowers, boats, and other fuel-powered tools also cause air pollution. Even certain paints and household cleaners create air pollution.

Now let's take a look at how your everyday actions might impact the air quality around you.

Make a list of ways you use energy each day. Start a list from the time you wake up in the morning until the time you get to school.

Hint: Think about all the things you would not be able to do or you would miss if the power went out. Also think about other actions that use gasoline or other fuel.

My Morning Energy List:

_____

_____

_____

_____

_____

_____

_____

_____

_____

Name_____ Date_____

Now, look at your Morning Energy List and add the correct number of checkmarks under the Student Check List column for each category listed below. You can also add in extra actions you might have come up with in the extra spaces provided.

Actions	Some Resulting Pollutants	Student Check List
Transportation ■ Car or truck ride to school today – add two checkmarks ■ Bus or carpooled – add only one checkmark ■ Walked, biked, or skateboarded today – NO checkmarks . You produced NO air pollution!	Carbon Dioxide (CO_2) Carbon Monoxide (CO) Nitrogen Oxides (NOx)	
Electricity Use (Hair dryer, microwave, garage door, cell phone, radio, lights, computer, air conditioning, etc.) ■ Add one checkmark for every item you used.	Carbon Dioxide (CO_2) Carbon Monoxide (CO) Nitrogen Oxides (NOx) Particle Pollution Sulfur Dioxide (SO_2) Volatile Organic Compounds (VOCs)	
Other Gas Powered Engines (Lawn mower, snow blower, boat, leaf blower, trimmer, etc.) ■ Add one checkmark for every item you used.	Carbon Dioxide (CO_2) Carbon Monoxide (CO) Nitrogen Oxides (NOx)	
Open Burning (A fire in the fireplace or burned trash or yard waste outside.) ■ Add one checkmark if someone at your house open burned.	Particle Pollution Toxins	

Name_____ Date_____

What in the world are **carbon monoxide**, **carbon dioxide**, **sulfur dioxide**, **nitrogen oxide**, **particle pollution**, **VOCs**, and **toxins**? I know it's a mouthful! These are all different pollutants that when released into the environment in large quantities can be harmful not only to the natural world around us, but to humans too! All of these pollutants are usually released into the environment as gases except for particle pollution, which is made up of very, very small particles (like soot from a fire) that can get trapped in our lungs.

The problem with air pollution is that a lot of times you cannot see it, so we are going to do a quick activity to help you think about what you might do if you could actually see the pollutants in the air…

Activity

1. Get a clear cup or glass and fill it about halfway with water.

2. Fill in the Pollutant Table below. (Ask your teacher for a list of ingredients.)

Pollutant:	Mixture Ingredient:
CO	
CO_2	
NOx	
Particle Pollution	
SO_2	
Toxins	
VOCs	

3. Using your Student Checklist and the Pollutant Table add the ingredients that were produced by your actions to your cup of water. After adding your ingredients, make sure you stir it up really well!

4. Answer the Follow Up Questions on the next page.

Name_____ Date_____

Follow Up Questions:

1. What does your cup look like?

2 Can you tell what pollutants came from what actions?

3. If air pollution was this easy to see would you want to breathe the air?

4. Now revisit your activities for the day. What could you do differently to reduce the amount of pollution you released?