



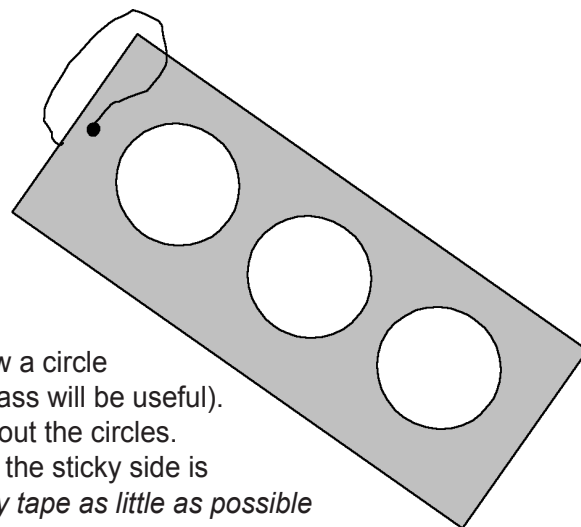
How Can We Monitor Air Pollution?

Purpose: Construct and test air pollution monitoring equipment.

Procedure

Making a Particle Collector and Ozone Monitor

1. Cut a piece of heavy paper to 10 cm x 15 cm in size or obtain a 4" x 6" index card.
2. Fold the paper or index card in half lengthwise.
3. Open the paper or index card and place marks down the center line at 4 cm, 8 cm, and 12 cm. *These marks will be the centers of your circles.*
4. From each mark, measure 1.2 cm in four directions and draw a circle to connect the dots (a template such as a quarter or a compass will be useful).
5. Fold the paper or index card lengthwise once again and cut out the circles.
6. Place strips of sticky tape on the paper or index card so that the sticky side is exposed through all three holes. *Remember: touch the sticky tape as little as possible to avoid contaminating your collector.*
7. Punch a small hole at the top and run a string through it for hanging the monitor.
8. Obtain a piece of ozone paper from your teacher. Staple or tape it to the bottom or side of your particle collector.
9. Put your collector and ozone monitor in a plastic bag to avoid contamination.



Placing the Pollution Monitors

1. As a class, decide what types of sites you will choose for placement of your collectors. In making your choice, consider the following questions.
 - What types of sites will the weather permit you to use?
 - Will you monitor sites around the school or sites around where you live?
 - What areas **outside** the school/home are likely to be sources of particle pollution and/or ozone?
 - Are there any areas **inside** the school/home that may be a source of ozone?

On your datasheet, list possible sources of pollution and list possible sites around your home or school where you might place your monitors.
2. Choose where you will place your monitor and write it on your datasheet as well as on the class data sheet. Also write your name and your monitoring site on your collector.
3. Place your monitor at your site early in the morning. You will need to remove it from your plastic bag. You also will need to spray your ozone test strip lightly with water when you hang the monitor. *Make sure to place a piece of paper over the particle collector as you spray the ozone paper to prevent the particle collector from getting wet.*
4. For each day that your monitor is in place, record the weather conditions in **Table 1**.
5. After approximately 8 hours or less, remove the ozone paper from your monitor and place it in your plastic bag. Leave your particle collector at the site for an additional day or two. *Make sure to take down any outdoor monitors during periods of rain. Note how long the monitor was out of service if you had to take it down.*
6. Take down your particle collector when instructed by your teacher and place in your plastic bag. Your teacher will have set up a "control," which is a monitor that is kept in the plastic bag for the duration of the monitoring.



Placing Your Air Quality Monitors

- List the locations of possible sites around your school or home where you might place your monitors. Predict the level of particles and ozone (High, medium, low).

	Possible Site	Particle Level	Ozone Level
a.	_____	_____	_____
b.	_____	_____	_____
c.	_____	_____	_____

- Write the name of the site where you will place your air quality monitor below and why you selected this site.

- Fill in Table 1 for each day your monitor is outside. Look in the newspaper or watch the weather forecast for weather conditions.

Table 1. Weather Conditions on Days Monitored

Date				
Average Temperature				
Cloud Cover				
Wind Speed and Direction				

Analyzing Ozone

- After 8 hours, remove your ozone strip from the air quality monitor. Put it in the plastic bag and bring it back to school. Lightly spray your ozone strip with distilled water and observe the color. Compare the strip to the control strip and relate the color of your strip to the ozone level:

Little or no color change – low ozone
 Lavender – medium ozone
 Blue or purple – high ozone

Record your results on **Table 2**.



Analyzing Particles

5. Place the transparency containing a 5 mm by 5 mm grid over the sticky side of the monitor. Examine your particle collector using a microscope or magnifier. Count the number of particles in four different randomly selected squares and record your results below. Find the average number of particles you collected by adding up the four numbers and then dividing by 4.

square 1 _____ square 2 _____ square 3 _____ square 4 _____

Average number of particles per square = _____ (record in **Table 2**)

6. Record the shapes and relative sizes of the particles that you found on your collector in **Table 2**. Some particle shapes include: triangular, square, round, round with hairs, star shaped, and irregular.

Do you have any idea what some of your particles are? If so, explain what observations helped you identify them.

Table 2. Particle Pollution and Ozone Levels at My Site

	Ozone Paper Color	Ozone Level	Average Number of Particles/ square	Description of Particles
My Prediction				
Actual Levels				

7. Using the data from everyone's **Table 2**, create a map of the ozone levels and particle pollution in the school or community area that you monitored. What areas have the highest levels of pollutants? Which have the lowest?

Highest _____

Lowest _____

8. If members of your class measured ozone and particle levels on different days, was there any correlation between the weather conditions and these levels? Explain.

9. What did your class find out about particle and ozone pollution in your school or community?