

Air Particles and Air Quality

Objective

In this experiment you will test the quality of air by measuring the number of air particles from different locations.

Introduction

The air we breathe has a lot to do with our health. As we breathe in fresh air, our lungs absorb oxygen from the air and pass it into our blood stream so it can be transported throughout our bodies. Oxygen is important for our whole body to have the energy it needs to survive.

It is important for all of us to have clean air to breath. People living in industrial areas are more likely to develop asthma. People who smoke are more likely to suffer from lung disease. You may have seen an example of the lungs from a smoker which are small, black and unhealthy looking. Years and years of breathing particles of tar and smoke can cause the lung tissue to develop cancer, and can even cause death.

Breathing clean air is important for keeping your lungs nice and healthy. Tiny particles of dust and soot in the air can enter your lungs when you breathe, and can block the movement of oxygen. Harmful particles can come from pollutants in the air like dust, smog, soot, smoke, and other chemicals. Because of the importance of clean air to our health, most cities keep track of air pollution by issuing smog warnings on days when there is a high level of air pollution.

How clean is the air where you live? What about around your school, where you play at the park, or where your parents go to work? Is the air at a park cleaner than air near a busy intersection? You can do a simple experiment with Vaseline to find out the answers to these questions.

To do this project, you should do research that enables you to understand the following terms and concepts:

- air quality
- smog
- particles
- lungs
- asthma

Materials and Equipment

- Vaseline
- string
- black permanent marker
- milk carton
- hole punch
- magnifying lens
- digital camera

Experimental Procedure

Save a milk carton to use for your experiment. Clean and dry the carton thoroughly before use.

Cut the carton into four flat pieces by cutting along the side seams of the carton. Cut each side into 3 square pieces, each piece will be approximately 3 inches long and 3 inches wide. You will have a total of 12 squares when you are done.

Using the hole punch, punch a hole in one corner of each square.

Tie a piece of string through the hole to make a loop for hanging the square up, on a tree branch for example.

Make a data sheet to record where you place your squares, and what data you later will collect from them:

data table.

Location			
Square 1			
Square 2			
Square 3			
TOTAL			
Average			

1. Decide on your four locations. Good locations are: your back yard, a busy street corner, your school, a park, a shopping centre, a parking lot, etc.
2. Write the name of each location in your data table. Include the cross streets (the address) or the name of the location in your table.
3. Using your black permanent marker, draw a 1 inch by 1 inch box in the centre of the white side (what used to be the inside of the carton) of each square.
4. Write the name of the location on the bottom of each square, you will use three squares for each location.
5. At each location, find a place to hang up three of your collection squares. You can hang the squares from a tree branch, sign post, light post, or any other safe landmark. If the location is busy with traffic, be sure to have an adult with you for safety.
6. Before you hang each square up, spread a thin layer of vaseline in the black box in the centre of each square with your finger. Hang up the collection square.
7. Leave your collection squares for 3–5 days. It is best to leave them on days when there is no rain, so if you hear it is going to rain be sure to go and collect them even if you have not left them out for a full five days.
8. After you have waited, it is time to collect your data from the squares.
9. Revisit each location bringing your data table, magnifying glass and a digital camera.
10. Remove the squares one at a time. Each time, use your magnifying glass to count the number of visible particles you see stuck in the Vaseline inside the boxed area. Write the number in your data table.
11. Take a picture of the square. If your camera has a micro-setting for close ups, the pictures will turn out better.
12. Proceed to the next square and/or location until you have collected all of your data and filled out your data table.
13. For each location you will have collected three sets of data, so you will want to average the data to get a better result. First add together the three counts and write the answer in the "TOTAL" box. Then divide this number by 3 and write the answer in the "Average" box.
14. Now you are ready to make a graph of your data. Make a bar graph by writing a scale for the number of particles on the left side (y-axis) and then by drawing a bar up to the correct number of particles for each location. Remember to label each bar of your graph, or make a colour key.
15. Print out your photos for your poster too.
16. Which sites had the most particulate matter in the air? Is this what you expected? Were each of your three counts the same or different? What do you think this tells you about the relative air quality at each location?