

SUMMARY PROJECT: AIR POLLUTION

TOPIC:

Measuring Air Pollution

INTRODUCTION:

Evidence of air pollution can be found in several places, including on leaves and in air particles. In this experiment, you will use the skills you acquired in previous experiments to test the air quality for evidence of pollution by examining leaves, leaf fungi, and particles in the air. In this way, you will produce a comprehensive profile of the air quality in your environment.

TIME NEEDED:

3 hours

parts of the experiment must be left for 24 and 48 hours

MATERIALS:

IMPORTANT: YOU WILL NEED PHOTOCOPIES OF EXPERIMENTS 6.002, 6.004, AND 6.005.

You will need the same materials as described in those experiments.

Safety Precautions

Adult supervision required. Please read and copy the safety precautions at the beginning of this book. Be careful when positioning slides and collecting leaves. Do not open sealed petri dishes; dispose of them carefully.

PROCEDURE:

1. Select two outdoor sites to measure air pollution. The two sites should be contrasting: one “clean” (such as a park), and one “dirty” (such as a busy street). Record the location of the two sites in the Data Table.
2. Use Experiment 6.002—“Dust in the Air”—to determine the amount of dust in the air at the two sites. At each site, use only one slide, placed in the flat, sticky-side-up position. Record your results in Part 1 of the Data Table.
3. Use Experiment 6.004—“Leaves and Air Pollution”—to measure the amount of dirt deposited on leaves from the air. Record your results in Part 2 of the Data Table.
4. Use Experiment 6.005—“Leaf Fungi and Air Pollution”—to measure the quality of air at the two sites. Record your results in Part 3 of the Data Table.

DATA TABLE

Site 1 was:

Site 2 was:

Part 1—Dust

Slide	Number of particles			Average number of particles	Number of particles per mm ²
	Sample 1	Sample 2	Sample 3		
Site 1					
Site 2					

Part 2—Leaves

Twig #1

Site 1

Age of leaf (years)	Stick transparent tape here		
1			
2			
3			
Twig #2 Age of leaf (years)	Mass of tissue + dirt (g)	Mass of tissue (g)	Mass of dirt (g)
1			
2			
3			

Part 2 continued

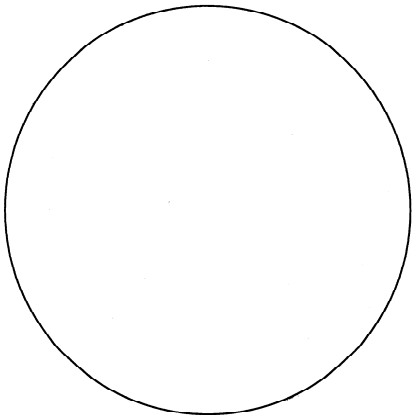
Site 2

Twig #1

Age of leaf (years)	Stick transparent tape here		
1			
2			
3			
Twig #2 Age of leaf (years)	Mass of tissue + dirt (g)	Mass of tissue (g)	Mass of dirt (g)
1			
2			
3			

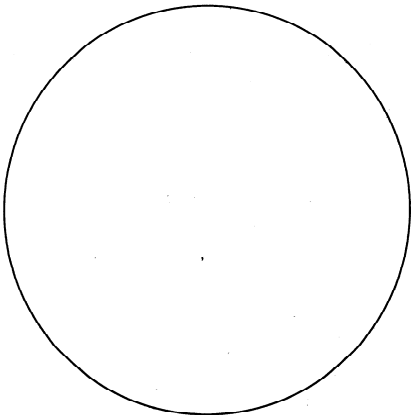
Part 3

LEAF FUNGI RECORD SHEET



Number of colonies in petri dish A

.....



Number of colonies in petri dish B

.....

ANALYSIS:

1. Compare the two sites in terms of dust pollution detected by the slides.
2. Compare the two sites in terms of dirt deposited on leaves.
3. Compare the two sites in terms of the abundance of fungi on the leaves of plants growing there.
4. Do the results of the three parts of the experiment agree as to which site has more polluted air?
5. Write a report which collates the results you found in this experiment.
6. Do some research. What do you think is (are) the source(s) of air pollution in the dirtier area?

OUR FINDINGS:

See Section X.

Our Findings

VI. POLLUTION PROJECTS

6.014 Summary Project: Air Pollution

1. Results will vary.
2. Results will vary.
3. Results will vary.
4. Results will vary.
5. Results will vary.
6. Results will vary.

SPECIAL SAFETY NOTE TO EXPERIMENTERS

Each experiment includes a short list of special safety precautions that are relevant to that particular project. However, these do not include all of the basic safety precautions that are necessary whenever you are working on a scientific experiment. For this reason, it is absolutely necessary that you read, copy, and remain mindful of the General Safety Precautions that follow this note.

Experimental science can be dangerous, and good laboratory procedure always includes carefully following basic safety rules. Things can happen very quickly while you are performing an experiment. Things can spill, break, even catch fire. There will be no time after the fact to protect yourself. Always prepare for unexpected dangers by following basic safety guidelines the *entire* time you are performing the experiment, whether or not something seems dangerous to you at a given moment.

We have been quite sparing in prescribing safety precautions for the individual experiments. We made this choice for one reason: We want you to take very seriously every safety precaution that is printed in this book. If you see it written here, you can be sure that it is here because it is absolutely critical to your safety.

One further note—The book assumes that you will read the safety precautions that follow, as well as those at the head of each experiment you are preparing to perform, and that you will *remember* them. Except in rare instances, these precautions will not be repeated in the procedure itself. It is up to you to use your good judgment and pay attention when performing potentially dangerous parts of the procedure. Just because the book does not say **BE CAREFUL WITH HOT LIQUIDS** or **DON'T CUT YOURSELF WITH THE KNIFE** does not mean that you should be careless when simmering water or stripping an electrical wire. It does mean that when you see a special note to be careful, it is extremely important that you pay attention to it.

If you ever have a question about whether a procedure or material is dangerous, wait until you find out for sure that it is safe.

GENERAL SAFETY PRECAUTIONS

Accidents caused by carelessness, haste, insufficient knowledge, or taking unnecessary risks can be avoided by practicing safety procedures and being alert while conducting experiments. Be sure to check the experiments in this book for additional safety regulations and adult supervision requirements. If you will be working in a lab, do not work alone.

PREPARE:

- Clear all surfaces before beginning experiments
- Read the instructions before you start
- Know the hazards of the experiments and anticipate dangers

PROTECT YOURSELF:

- Follow the directions step-by-step; do only one experiment at a time
- Locate exits, fire blanket and extinguisher, master gas and electricity shut-offs, eye wash, and first-aid kit
- Make sure there is adequate ventilation
- Do not horseplay
- Wear an apron and goggles
- Do not wear contact lenses, open shoes, loose clothing, or loose hair
- Keep floor and work space neat, clean, and dry
- Clean up spills immediately
- Never eat, drink, or smoke in laboratory or work space
- Do not eat or drink any substances tested unless expressly permitted to do so by a knowledgeable adult

USE EQUIPMENT WITH CARE:

- Set up apparatus far from the edge of the desk
- Use knives and other sharp or pointed instruments with caution
- Pull plugs, not cords, when removing electrical plugs
- Don't use your mouth to pipette; use a suction bulb
- Clean glassware before and after use
- Check glassware for scratches, cracks, and sharp edges
- Clean up broken glassware immediately
- Do not use reflected sunlight to illuminate your microscope
- Do not touch metal conductors
- Use only low voltage and current materials such as lantern batteries
- Be careful when using stepstools, chairs, and ladders

USING CHEMICALS:

- Never taste or inhale chemicals
- Label all bottles and apparatus containing chemicals
- Read labels carefully
- Avoid chemical contact with skin and eyes (wear goggles, apron, and gloves)
- Do not touch chemical solutions
- Wash hands before and after using solutions
- Wipe up spills thoroughly

HEATING SUBSTANCES:

- Use goggles, apron, and gloves when boiling water
- Keep your face away from test tubes and beakers
- Never leave apparatus unattended
- Use safety tongs and heat-resistant mittens
- Turn off hot plates, bunsen burners, and gas when you are done
- Keep flammable substances away from heat
- Have fire extinguisher on hand

GOING ON FIELD TRIPS:

- Do not go on a field trip by yourself
- Tell a responsible adult where you are going and maintain that route
- Know the area and its potential hazards, such as poison plants, deep water, and rapids
- Dress for terrain and weather conditions (prepare for exposure to sun as well as to cold)
- Bring along a first-aid kit
- Do not drink water or eat plants found in the wild
- Use the buddy system; do not do outdoor experiments alone

FINISHING UP:

- Thoroughly clean your work area and glassware
- Be careful not to return chemicals or contaminated reagents to the wrong containers
- Don't dispose of materials in the sink unless instructed to do so
- Wash your hands
- Clean up all residue and put in proper containers for disposal
- Dispose of all chemicals according to all local, state, and federal laws

BE SAFETY CONSCIOUS AT ALL TIMES