



Investigating Air Pollution

DO NOT print off! Copies provided in class!

Procedures

Part I—Particulates in the Air

Materials: label, plastic microscope slide, magnifying glass, ruler, writing utensil.

1. At the end of at least one week, collect your plastic microscope slide from where you placed it in the building.
2. Measure and draw *three* 1cm squares on your label, being careful not to put unintended particles on the sticker by handling it.
3. Using a magnifying glass, look at the label at numerous angles and record what you see in the data table.
4. Now, count how many particles are in each of the squares (look for white as well as dark specs) and record these values in the data table respectively.
5. Calculate the *mean* for your counts to determine average particles per cm^2 and record this value in the data table.

Results:

- Below 100 particles per cm^2 =*slight* particle pollution
- Between 100-500 particles per cm^2 =*moderate* particle pollution
- Values over 500 particles per cm^2 =*high* particle air pollution

Part II—Smoke and Acidic Gases in Air

Experiment A—Smoke in the Atmosphere

Materials: Safety goggles, sampling container with lid, matchbook, distilled water, bromthymol blue indicator solution.

1. Fill a clean sampling container to the 10mL line with distilled water.
2. Using a pipet, add 5 drops of bromthymol blue indicator solution to the distilled water.
3. Place the lid on the sampling container and swirl the solution to mix. Record the resulting color and corresponding pH of the solution in the data table (see below). Remove lid.

Solution Colors and pH values: yellow=6.0pH, green=7.0pH and blue=7.6pH

4. Partner A should light and hold a match out for Partner B. With lid and container in hand, Partner B should “sandwich” the flame/match between the lid and the container while securing the lid to the container. This will cause the match to be snuffed out, creating significant smoke accumulation within the container.
5. Gently swirl the solution in the sampling container so as to mix the smoke with the solution for 20-30 seconds. Be aware that the match sandwiched in the lid may allow for a small opening through which solution may leak. Record the color and corresponding pH of the solution in the data table.
6. The match should be carefully removed, doused with water and then thrown away in the garbage can located next to the lab station. The solution may be poured down a drain with running water. Thoroughly rinse the sampling container with tap water for use in other experiments.

Experiment B—Outside/Classroom Air Acidity

Materials: Safety goggles, sampling container with lid, syringe with tubing, distilled water, bromthymol blue indicator solution.

1. Fill a clean sampling container to the 10mL line with distilled water.
2. Using a pipet, add 5 drops of bromthymol blue indicator solution to the distilled water.
3. Place the lid on the sampling container and swirl the solution to mix. Record the resulting color and corresponding pH of the solution in the data table:

Solution Colors and pH values: yellow=6.0pH, green=7.0pH and blue=7.6pH

4. Using a syringe with tubing (Figure 1), Partner A should draw outside/classroom air (away from people to avoid contamination of the drawn air sample) into the syringe by pulling on the syringe’s plunger, until full.
5. Holding the sampling container, Partner B should remove the lid from the container and hold it to allow Partner A to insert the tube of the syringe unit into the solution and release the air sample into the solution by pushing down on the syringe plunger.
6. Steps 4 and 5 should be repeated a total of 10 times.



Figure 1. Syringe with Tubing

7. Replace the lid and secure. Gently swirl to mix the air samples with the solution for approximately 20-30 seconds. Record the color and pH of the solution. (*continued on other side*)
8. The solution may be poured down a drain with running water. Thoroughly rinse the sampling container with tap water for use in other experiments.

Part III—Acid Rain

Experiment A—Effects of Acid Rain

Materials: Safety goggles, gloves (for steps 3-4), sampling container, marble chip, distilled water, hydrochloric acid.

1. Place a small marble chip in a clean sampling container.
2. Add roughly 20 drops of “unpolluted rainwater” to the marble chip. Record observations in data table. DO NOT clean out sampling container contents.
3. With gloves on and using a pipet, add 20 drops of “simulated acid rain” (1M hydrochloric acid) to the sampling container contents. Record observations in data table.
4. **Pour the contents of your sampling container into the waste beaker** (marble chip included), **NOT** the sinks. Thoroughly rinse sampling container with tap water for use in other experiments. Return gloves to appropriate box.

Experiment B—Acidity of Local Rainwater

Materials: Safety goggles, acid rain test strip and corresponding color chart, local rainwater sample.

1. Dip an acid rain test strip in one of the beakers of local (North Bend) rainwater for 1-2 seconds.
2. Within 5-10 seconds, compare the color of the test strip with the color chart provided. Record the color of the test strip and respective pH in the data table.
3. Place test strip in garbage can located by lab station.