

## CLASS 2

### INTRODUCTION TO AIR POLLUTION

#### **I. Introduction**

The second class introduces several fundamental air pollution concepts, which lay some of the groundwork for the two remaining air pollution classes. These include global warming, acid rain, stratospheric ozone (the “ozone hole”), smog formation (“ground level ozone”), and particulate matter. Included in this class is a short experiment that demonstrates the corrosive effects of acid rain and a poster-making activity intended to reinforce all of the concepts discussed in class.

These concepts can be difficult for students to grasp. For example, students often will confuse the ozone hole with the greenhouse effect. Students are best able to grasp these concepts through the use of visual aids such as blackboard sketches and the acid rain experiment. We suggest having two class leaders to present the concepts in order to provide variety to the presentations. In addition, at least four firm members should attend, so that each group of students has an adult assigned to help the students understand the issues and keep them on task during the chalk experiment and poster-making activity described below.

The acid rain experiment is a good way to engage the students in science and reinforce the lesson. The experiment consists of placing chalk in different solutions and recording what occurs. The more acidic the solution, the more the chalk dissolves. The details of the chalk acid rain experiment are available on the web at <http://www.epa.gov/airmarkets/acidrain/effects/materials.html>. A more complex chalk experiment is also available at <http://p12.livetext.com/doc/3370>. Because the time for the experiment is limited, have the students look for the bubbles that are released when the chalk is first placed in the vinegar. The students can also reexamine the chalk at the end of the class (or the next day) to see how much has dissolved. We recommend dividing the class into small groups and allowing each group to conduct its own experiment.

The activity consists of making posters from magazines that illustrate the concepts, such as a car advertisement to represent emissions causing smog, or a power plant to represent emissions causing global warming. The activity handout is designed around dividing the students into four groups, each with a separate topic (smog, global warming, acid rain and the ozone hole). Each group finds pictures in the magazines that illustrate their issue. They then cut out the pictures, paste them on construction paper and write any necessary explanations to create posters. The vocabulary list comes with examples to help the students get started. The firm member assigned to each group should help with suggestions if the students are reluctant, although they rarely are. More importantly, make sure that the students explain their selections in writing on the poster (*i.e.*, explaining that the car emits CO<sub>2</sub> that leads to global warming). Have each group decide who will present their poster (this can be more than one person). The lead presenter(s) from the firm should ask questions of the students as they present their posters.

The poster activity tends to take more time than expected. We recommend scheduling 25 minutes for the activity.

**Tips:**

- Remember to bring magazines, poster board and markers. Almost any kind of magazine will do.
- Remember to bring vinegar, chalk and glasses for the acid rain experiment.
- Make sure the teacher has scissors and glue ahead of time, or bring some with you.
- Try to expand the variety of the posters beyond cars. The students naturally gravitate towards the car ads, but encourage them to be creative.
- As always, confirm the class before going over and arrive early.
- The presentation of the posters tends to be much smoother than other presentations in other classes - having the prop helps them stay focused and also gives them something to stand behind. Nonetheless, try to prep them before the presentation by questioning them about their poster. And, as always, offer them plenty of encouragement both during and afterwards.
- Encourage the students' teacher to put the posters up in either the classroom or even the hallways. It's a good way to make the lessons discussed stick with the students and even be spread beyond their one classroom.

**II. Resources**

If you are not familiar with all or some of the concepts, simply would like a refresher, or desire plenty of ammunition for responding to questions, below are some good internet resources. Additionally, some of the resources for the other classes overlap with Class 2's topics. Likewise, see the Resources section of the Introduction to the Class Series for general resources and teaching materials.

**EPA**

Air - <http://www.epa.gov/ebtpages/air.html>

Acid Rain - <http://www.epa.gov/ebtpages/airairpolacidrain.html>

Kids Page - [http://www.epa.gov/acidrain/site\\_students/index.html](http://www.epa.gov/acidrain/site_students/index.html)

Global Warming - <http://yosemite.epa.gov/oar/globalwarming.nsf/content/index.html>

Kids Page - <http://www.epa.gov/globalwarming/kids/index.html>

Ozone Hole - <http://www.epa.gov/ozone/index.html>

**NOAA**

Global Warming - <http://www.ncdc.noaa.gov/oa/climate/globalwarming.html>

Ozone Hole - <http://www.ozonelayer.noaa.gov/science/science.htm>

**U.S. Geological Survey**

Acid Rain - <http://answers.usgs.gov/cgi-bin/gsbrowse?tcode=124>

<http://pubs.usgs.gov/gip/acidrain/2.html>

**EDE**

Global Warming -

<http://www.environmentaldefense.org/system/templates/page/issue.cfm?subnav=12>

Air Quality -

<http://www.environmentaldefense.org/system/templates/page/issue.cfm?subnav=5>

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