

Grades: 6-8

Lesson Plan Title: Human Impacts on the Earth's Atmosphere

General Goal(s):

This lesson will introduce the variety of ways in which humans impact the Earth's atmosphere.

Specific Objectives:

Use a computer presentation to explain the ways in which humans impact the atmosphere. Specifically, emission of:

- greenhouse gases
- ozone-depleting substances
- air pollutants

Complete a hands-on activity by building a spectroscope – example of instrument used to view the spectra of various light sources.

Required Materials:

- computer and projector
- blank cds
- card stock paper with printed spectroscope template
- scissors
- tape
- box cutter for cutting slit in template
- variety of light bulbs
- coloured pencils
- photocopy of worksheet

Lead-In:

The teacher can introduce the lesson by leading a quick question and answer section on the atmosphere to assess students' knowledge. The teacher can also use the short news article below to begin a historical overview of chemicals used in the past (chlorofluorocarbons (CFCs) and other greenhouse gases).

The links in the useful links section should be used to gather additional information about greenhouse gases; however, the timeline found at <http://www.aip.org/history/climate/timeline.htm> is a concise and useful summary on the history of climate change.

Possible lead-in article can be found at:

<http://earthobservatory.nasa.gov/Features/WorldWithoutOzone/printall.php>

Title: *The World We Avoided by Protecting the Ozone Layer*

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Reference: Newman, P. A., Oman, L. D., Douglass, A. R., Fleming, E. L., Frith, S. M., Hurwitz, M. M., Kawa, S. R., Jackman, C. H., Krotkov, N. A., Nash, E. R., Nielsen, J. E., Pawson, S., Stolarski, R. S., and Velders, G. J. M. (2009). *What would have happened to the ozone layer if chlorofluorocarbons (CFCs) had not been regulated?* Atmospheric Chemistry and Physics, 9(6), 2113-2128.

Step-By-Step Procedures:

1. Lead in (5-10 min)
2. Deliver computer presentation (25 min)
3. Give an explanation of how spectrosopes work and how they can be used. (10 min)
4. Have students build spectrosopes (10 min)
5. Have students use spectrosopes to analyze light and record their results on the worksheet. (15-20 min)

Plan for Independent Practice:

Have the students take the spectrosopes home to analyze other types light sources.

Provide a question sheet about the activity.

Assessment:

Collect worksheet and/or question sheet for marking.

Did students accurately draw spectra?

Do students understand the meaning of the difference between the spectra of different light sources?

Can students draw assumptions from learned information?

Useful Links:

Build a Spectroscope –

<http://jchemed.chem.wisc.edu/HS/Journal/Issues/2006/Jan/clicSubscriber/V83N01/p56.pdf>

- A DVD Spectroscope: A Simple, High Resolution Classroom Spectroscope

Ozone Layer Fact Sheet – http://www.msc-smc.ec.gc.ca/cd/factsheets/ozone/index_e.cfm

Intergovernmental Panel on Climate Change – <http://www.ipcc.ch/>

History of Climate Change - <http://www.aip.org/history/climate/timeline.htm>

History of Ozone Depletion -
<http://www.nas.nasa.gov/About/Education/Ozone/history.html>

Brief History of CO₂ Measurements -
http://airs.jpl.nasa.gov/story_archive/Measuring_CO2_from_Space/History_CO2_Measurements/

Kyoto Protocol - <http://unfccc.int/resource/docs/convkp/kpeng.html>

Environment Canada Air Pollution -
<http://www.ec.gc.ca/default.asp?lang=En&n=499D6B13-1>

Keywords: Environment, impacts, interaction, radiation, weather, wavelengths, infrared, ultraviolet, absorption, atmosphere, pollution, ozone layer, climate change