Particle Pollution:
How Dirty is the Air We Breathe?

Target Grade Levels
Fourth

Time
One hour

Materials
- index cards
- petroleum jelly
- masking tape
- block of wood
- white paper for each child or each group of children

Knowledge and Skills (TEKS)
- Science:
  - Acquire data through the senses; and
  - The student shall be given opportunities to observe properties and patterns of objects, organisms, and events in the environment.

Overview
To make a simple device that can be used to collect and observe the pollution in our air.

Background Information
The atmosphere is almost completely made up of invisible gaseous substances. Most major air pollutants are also invisible, although large amounts of them, concentrated in areas such as cities, can be see as smog. One often visible air pollutant is particle pollution, especially when the surfaces of buildings and other structures have been exposed to it for long periods of time or when it is present in large amounts. Particulate matter is made up of tiny particles of solid matter and/or droplets of liquid. Natural sources include volcanic ash, pollen, and dust blown about by the wind. Coal and oil burned by power plants and industries and diesel fuel burned by many vehicles are the chief sources of manmade particulate pollutants, but not all important sources are large scale. The use of wood in fireplaces and stoves also produces rather significant amounts of particle pollution in localized areas, although the total amounts are much smaller than those from vehicles, power plants, and industries.

Procedure
1) Vocabulary
   a) air
   b) pollution
   c) particle
   d) particulate matter
   e) anthropogenic

2) Activities
   a) Tell the students, "As we look outside, we see a clear blue sky. Where is the pollution? We are going to make a simple test for air pollution so we can see the pollution."

b) Coat the plastic square with a thin, even coat of petroleum jelly. With masking tape, fasten the square, jelly side up, to the wooden block.

c) Let the students examine the pollution which was collected on the petroleum jelly

d) Let the groups record the findings of their tester.

e) Have groups share their findings with the other groups.

   i) Did your collect any dirt particles?

   ii) How does your square compare to those of the other groups?

   iii) In what places does the air seem to be the dirtiest?

f) We have seen dirt collected by devices where our eyes could detect nothing. We must have air to live. We must do everything we can to clean the air we have and keep our future air clean.

3) Review

   a) Discuss results, encourage students to brainstorm the likely types of particles collected and the sources of those particles.

   b) Brainstorm the likely amounts and types of particles that would be collected if these devices were placed in different parts of the school and school grounds.

4) Evaluation

   a) Students can be quizzed on vocabulary.

   b) Extension activities can be performed as graded exercises.

5) Extension

   a) See the Particle Pollution "Information, Activities and Data" page (at www.tnrcc.state.tx.us/air/monops/lessons/partinfo.html) for suggested activities using particle pollution data collected by the Texas Natural Resource Conservation Commission and provided in the "El Paso Particulate Data" "Houston Particulate Data," "El Paso Particulate Map," and "Houston Particulate Map" files.

   b) Have students write a paper and explain the differences they observed among the plastic squares.

   c) Have students take their tester home to test the pollution for 24 hours. Students will then report to the class of their findings.

   d) Ask students to leave the tester outside for a week, a month (shelter from precipitation). Students will keep a journal of its progress each day and report to the class.

   e) Have students compile data on their findings and write the mayor about their samples.

Adapted from: “Particulate Matter: How Dirty is the Air We Breathe?” *Texas Commission on Environmental Quality.* www.tnrcc.state.tx.us/air/monops/lessons/lesson_plans.html.

Reference: Holt Science 6th. Holt, Rinehart, and Winston Publishers, New York. p. 257.

Acknowledgement: Alica L. Smith and Stacy Butler, Stephen F. Austin University Nacogdoches TES Course, 1994