

AIR QUALITY

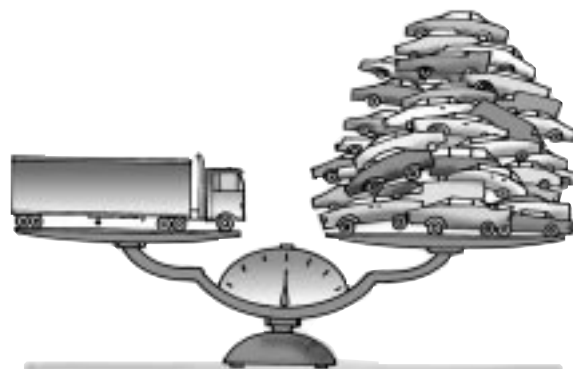
Air Quality and Vehicle Emissions

Congress has passed laws requiring states to maintain certain air quality standards established by the EPA to provide a healthy environment. Today, transportation fuels are central in environmental issues because tailpipe emissions are the largest contributors to air pollution. Carbon monoxide, nitrogen oxides, hydrocarbons and particulate matter are the primary pollutants found in vehicle emissions.

Breathing clean air is a desire of everyone. A good example is the anti-smoking education and awareness campaign which led to effective smoking restrictions in the United States. The smoking ban illustrates an important change in environmental awareness. The public's requirement to have the choice of a smoke-free indoor environment can be identified with increasing public demand for reduced automobile emissions, cleaner-burning fuels, and cleaner outdoor air. Increased awareness will influence the public to demand that their elected officials support alternative fuel policies that will lead to cleaner air, healthier economies and reduced reliance on foreign oil.

Today's autos use less than one-third of the energy contained in a gallon of gas, wasting the rest. The incomplete burning of gasoline and diesel fuels causes over half of all air pollution. Despite technological improvements that have made great strides in reducing emissions, pollution levels are expected to rise significantly because of the increased number of vehicles on the roads.

Pollution from diesel engines is one of the most critical air pollution problems. The diesel engine is not only among the biggest sources of urban air toxics and fine particulate soot but diesel may also be the largest source of smog-forming nitrogen oxide emissions.



One diesel truck can emit as much pollution as 100 cars.

Vehicle emission's pollution affects all living things, humans, animals and plants. It forms ground layer ozone which makes it hard for many individuals to breathe; and aggravates inversions, which occur when the air near the ground is colder than the air above it, trapping pollutants near the ground.

Use of alternative fuels can significantly reduce vehicle emissions and air pollution. Educating the public about the benefits and availability of alternative fuel vehicles is the first step in increasing their use and improving air quality.

Air Pollutants Defined

Carbon monoxide (CO), a colorless, odorless gas, results from incomplete fuel combustion.

Nitrogen oxides (NO_x) are the result of subjecting nitrogen and oxygen in the air to high temperature and high pressure conditions in an internal-combustion engine.

Hydrocarbons (HC) result from unburned or partially burned fuel molecules or from fuel evaporation. Some hydrocarbons react with NO_x in the presence of sunlight to form ozone.

Particulate matter (PM₁₀) are the small particles, that may or may not be visible, that make up pollutants.

Student Activity

Air pollution is the addition of harmful substances to the atmosphere. Air pollution directly affects our health and well-being. It also affects the environment, which indirectly affects our health and reduces our quality of life.

This experiment will allow students to see air pollutants that are the result of vehicle emissions.

Air Pollution Experiment

Materials:

- Petroleum jelly
- Magnifying glass or microscope
- 3" x 5" (7 cm x 12 cm) index cards

Procedure:

Smear petroleum jelly on a card. Hold the card near the tail pipe or exhaust system of a diesel-fueled vehicle when it is started. Do the

same thing with a vehicle fueled by gasoline, natural gas, electricity, propane, or other alternative fuel. You can also use electric or gasoline fueled lawn and garden equipment, construction equipment or fork lifts.

Look at the cards under a magnifying glass or microscope. Which cards show the most pollutants? The least? Make a line graph to illustrate your findings.