U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF MOBILE SOURCES

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Automobiles and Carbon Monoxide

What is Carbon Monoxide?

Carbon monoxide (CO) is a colorless, odorless, poisonous gas. A product of incomplete burning of hydrocarbon-based fuels, carbon monoxide consists of a carbon atom and an oxygen atom linked together.

Why is Carbon Monoxide a Public Health Problem?

Carbon monoxide enters the bloodstream through the lungs and forms carboxyhemoglobin, a compound that inhibits the blood's capacity to carry oxygen to organs and tissues. Persons with heart disease are especially sensitive to carbon monoxide poisoning and may experience chest pain if they breathe the gas while exercising. Infants, elderly persons, and individuals with respiratory diseases are also particularly sensitive. Carbon monoxide can affect healthy individuals, imparing exercise capacity, visual perception, manual dexterity, learning functions, and ability to perform complex tasks.

In 1992, carbon monoxide levels exceeded the Federal air quality standard in 20 U.S. cities, home to more than 14 million people.

How is Carbon Monoxide Formed?

Carbon monoxide results from incomplete combustion of fuel and is emitted directly from vehicle tailpipes. Incomplete combustion is most likely to occur at low air-to-fuel ratios in the engine. These conditions are common during vehicle starting when air supply is restricted ("choked"), when cars are not tuned properly, and at altitude, where "thin" air effectively reduces the amount of oxygen available for combustion (except in cars that are designed or adjusted to compensate for altitude).

Nationwide, two-thirds of the carbon monoxide emissions come from transportation sources, with the largest contribution coming from highway motor vehicles. In urban areas, the motor vehicle contribution to carbon monoxide pollution can exceed 90 percent.

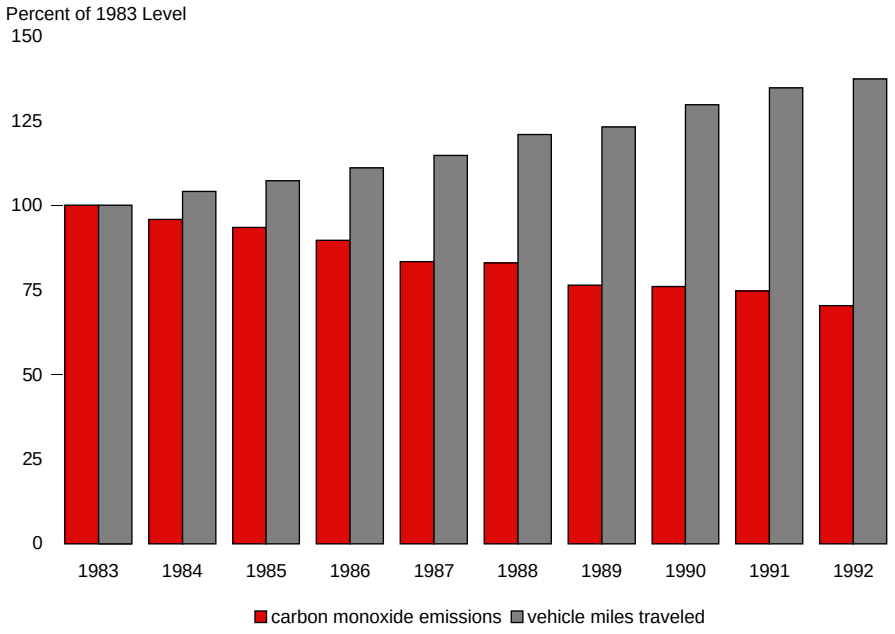
What's Been Done to Control Carbon Monoxide Levels?

The Clean Air Act gives state and local governments primary responsibility for regulating pollution from power plants, factories, and other "stationary sources." The U.S. Environmental Protection Agency (EPA) has primary responsibility for "mobile source" pollution control.

The EPA motor vehicle program has achieved considerable success in reducing carbon monoxide emissions. EPA standards in the early 1970's prompted automakers to improve basic engine design. By 1975, most new cars were equipped with catalytic converters designed to convert carbon monoxide to carbon dioxide. Catalysts typically reduce carbon monoxide emissions upwards of 80 percent. In the early 1980's, automakers introduced more sophisticated converters, plus on-board computers and oxygen sensors to help optimize the efficiency of the catalytic converter.

Today's passenger cars are capable of emitting 90 percent less carbon monoxide over their lifetimes than their uncontrolled counterparts of the 1960's. As a result, ambient carbon monoxide levels have dropped, despite large increases in the number of vehicles on the road and the number of miles they travel. With continued increases in vehicle travel projected, however, carbon monoxide levels will begin to climb again unless even more effective emission controls are employed.

Carbon monoxide emissions have dropped, despite increased travel



What Else Is Being Done?

Carbon monoxide emissions from automobiles increase dramatically in cold weather. This is because cars need more fuel to start at cold temperatures, and because some emission control devices (such as oxygen sensors and catalytic converters) operate less efficiently when they are cold.

Until 1994, vehicles were tested for carbon monoxide emissions only at 75° F. But recognizing the effect of cold weather, the 1990 Clean Air Act calls for 1994, and later, cars and light trucks to meet a carbon monoxide standard at 20° F as well.

The 1990 Clean Air Act also stipulates expanded requirements for Inspection and Maintenance programs. These routine emission system checks should help identify malfunctioning vehicles that emit excessive levels of carbon monoxide and other pollutants. The inspections will be complemented by requirements for on-board warning devices to alert drivers when their emission control systems are not working properly.

Another strategy to reduce carbon monoxide emissions from motor vehicles is to add oxygen-containing compounds to gasoline. This has the effect of "leaning out" the air-to-fuel ratio, thereby promoting complete fuel combustion. The most common oxygen additives are alcohols or their derivatives.

Several Western U.S. cities have successfully employed wintertime oxygenated gasolines for many years. The 1990 Clean Air Act expands this concept and requires that oxygenated gasolines be used during the winter months in certain metropolitan areas with high carbon monoxide levels (see a listing on the reverse side of this page).

For More Information:

The Office of Mobile Sources is the national center for research and policy on air pollution from highway and off-highway motor vehicles and equipment. You can write to us at the EPA National Vehicle and Fuel Emissions Laboratory, 2565 Plymouth Road, Ann Arbor, MI 48105. Our phone number is (313) 668-4333.

Cities* Participating in Wintertime Oxygenated Fuels Program

Albuquerque, NM
Baltimore, MD
Chico, CA
Colorado Springs, CO
Denver-Boulder, CO
El Paso, TX
Fort Collins-Loveland, CO
Fresno, CA
Grants Pass, OR
Greensboro-Winston Salem-High Point, NC
Klamath County, OR
Las Vegas, NV
Los Angeles-Anaheim-Riverside, CA
Medford, OR
Minneapolis-St-Paul, MN-WI
Missoula, MT
Modesto, CA
New York-N. New Jersey-Long Island, NY-NJ-CT
Philadelphia-Wilmington-Trenton, PA-NJ-DE-MD
Phoenix, AZ
Portland-Vancouver, OR-WA
Provo-Orem UT
Raleigh-Durham, NC
Reno, NV
Sacramento, CA
Salt Lake City, UT
San Diego, CA
San Francisco-Oakland-San Jose, CA
Seattle-Tacoma, WA
Spokane, WA
Stockton, CA
Washington, DC-MD-VA

* The 1990 Clean Air Act requires oxygenated fuels in designated CO nonattainment areas where mobile sources are a significant source of CO emissions.