

Carbon Monoxide

General

Carbon monoxide (CO) is a colorless, odorless, tasteless, poisonous gas. It occurs naturally in the air as the result of processes such as agricultural fires, oxidation of methane, plant growth and decay and other natural processes. Man-made sources of CO are responsible for the high concentrations often found in urban areas. CO is a byproduct formed when carbon in fuels is not completely burned.

The urban atmosphere contains 100 times as much CO as any other pollutant. While it is the most abundant pollutant in urban air, the accumulation of numerous other pollutants may be more hazardous even in comparatively lower concentrations. The high concentration of urban CO is produced primarily by motor vehicles. CO is also released by some industrial processes and in-home activities. Since motor vehicles are the major source of CO, daily concentration peaks coincide with morning and evening rush hours when city traffic is heaviest.

Effects

CO affects the central nervous system by depriving the body of oxygen. Once inhaled, CO enters the blood stream and binds chemically to hemoglobin, the component of blood that carries oxygen through the body. Hemoglobin binds more readily with CO than with oxygen; thus, in the presence of CO, hemoglobin cannot adequately distribute oxygen to all tissues of the body. CO also weakens contractions of the heart, decreasing the volume of blood being pumped to the muscles and organs. The health threat is most serious for people suffering from cardiovascular disease who are unable to compensate for the decrease in oxygen. Individuals with anemia or lung diseases, fetuses, pregnant women and even healthy children are likely to be more susceptible to the health effects of CO. Healthy adults are affected as well, but only at higher levels of exposure. Visual impairment, reduced work capacity, reduced manual dexterity, poor learning ability, and difficulty performing complex tasks are often associated with exposure to high CO levels. At low concentrations, CO can affect mental function, vision, and alertness.

Standards

EPA has developed two national ambient air quality primary standards for CO: 35 parts per million (ppm) averaged over a 1- hour period and 9 ppm averaged over an 8-hour period. For the EPA to consider an area in compliance with the standard, these values may be exceeded only once in a given year. Once an air quality monitor measures a second exceedance of either standard in a calendar year, a violation of the standard has occurred. Because EPA methodologies state that comparisons of air quality monitor data with the air quality standards should be made in integers, rounding up fractional parts of 0.5 or greater, actual concentrations of 9.5 and 35.5 ppm or greater are necessary for an exceedance to constitute a violation.

