What is carbon dioxide (CO2) and what are the sources?

Contributed by Carbon Currency Foundation

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Carbon dioxide is a colorless, odorless gas. It is produced when any carbon-based material used for fuel (coal, oil, wood, etc.) is burned. When fuel burning is not a factor, the main sources are tobacco smoke, human and animal respiration. Carbon dioxide is given off whenever we exhale. Cars, trucks, industrial equipment, and burning fuel for power are some of the major contributors to CO2 in the air.

What levels of CO2 are typical indoors?

The level of CO2 indoors depends upon:

the number of occupants

operation of combustion devices

the outdoor concentration

time of day the measurement is taken

the amount of outdoor air ventilating the area

Why do we measure CO2?

Carbon dioxide is not generally found at hazardous levels in an indoor environment, yet it is often measured when trying to determine the indoor air quality of a building. The reason is that it is a good surrogate measure of how well the ventilation system is working in relation to the number of occupants. CO2 is very easy and inexpensive to measure, and thus is commonly used as a preliminary test.

If the levels of CO2 are high, it is assumed that there may not be adequate ventilation to that area, which in turn may allow for the buildup of other environmental pollutants. According to the American Industrial Hygiene Association, if CO2 levels reach 800 ppm it is likely that occupants will start to complain about the comfort level. Controlling indoor air quality can be achieved through the use of fresh air ventilation and adequate mixing of air to dilute the contaminant load in a given environment.

What levels of CO2 are considered safe in my workplace?

The Occupational Safety and Health Administration (OSHA) and the American Conference of Governmental Industrial Hygienists (ACGIH) have set workplace safety standards of 5,000 ppm as an 8-hour time weighted average (TLV-TWA) exposure, and 30,000 ppm as the short term exposure level (STEL). The TLV-TWA is the average concentration for a normal 8-hour workday, 40-hour workweek to which nearly all workers may be exposed repeatedly, day after day, without adverse effects. The STEL is the maximum concentration for continuous exposure for a 15-minute time period.

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) recommends a concentration of CO2 no more than 700 ppm above the ambient air (outside) concentration in order to minimize human odors and maintain comfort.

What are the health effects of CO2 poisoning?

At very high levels, 30,000 ppm and above, CO2 can cause asphyxiation as it replaces oxygen in our blood. Other health effects at high levels (> 30,000 ppm) include: headache, loss of judgment, dizziness, drowsiness, and rapid breathing. It is rare to experience this level of CO2 in residential and office environments, however high levels may be found in some industrial settings. Occupants may experience health effects at much lower concentrations of CO2. This association is likely to be attributed to other contaminants in the air that are allowed to build up as a result of insufficient ventilation.