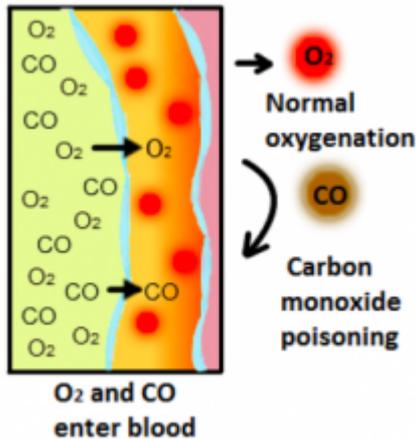


Here's Why Carbon Monoxide Is So Dangerous



By Josh Bloom — January 27, 2016



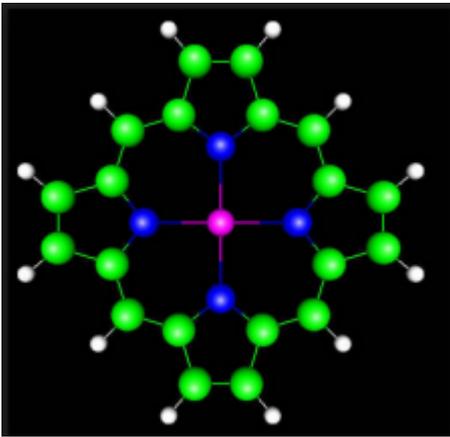
A winter never goes by without tragic stories about families

dying from carbon monoxide (CO) poisoning. During this week's blizzard, a mother and her young son were [killed in minutes](#) [1] while sitting in a running car as her husband tried to dig the vehicle out. Snow clogged the exhaust pipe, forcing the exhaust into the car.

Although carbon monoxide makes up only a small fraction of car exhaust -- about 1 percent vs. 70 percent nitrogen -- it is far more dangerous than nitrogen because of its chemical properties: carbon monoxide actually "steals" oxygen from your blood.

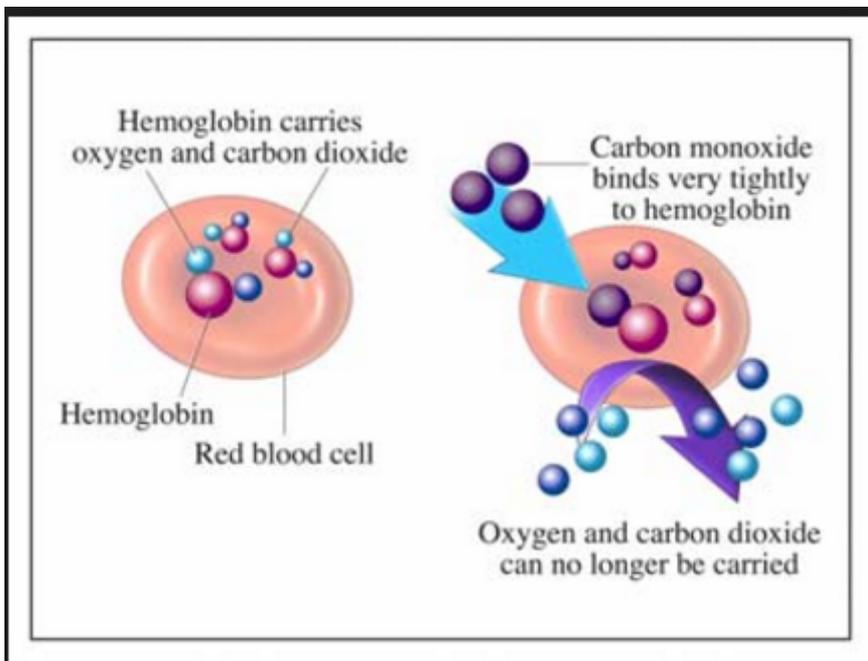
Either gas can cause asphyxiation and death, because each deprives oxygen to the brain, causing hypoxia, which is technically the cause of all deaths. Fatal [industrial accidents](#) [2], in which people are exposed to pure nitrogen, do occur, yet our atmosphere contains 78 percent nitrogen, so the gas itself is not toxic as long as there is sufficient oxygen present.

So, how is it possible for air containing 1 percent of carbon monoxide to cause hypoxia, even when there may be plenty of oxygen around? It is simple chemistry: Carbon monoxide *loves* to stick (bind) to iron. This also means that it also loves to bind to hemoglobin, the iron-based protein that is responsible for distributing oxygen throughout the body. The affinity of CO to hemoglobin is so strong that the gas binds [240 times more tightly](#) [3] to than does oxygen.



*The iron atom (pink) in hemoglobin is where both oxygen and carbon monoxide bind.
(Chemistryland.com)*

So, while it takes an overwhelming amount of nitrogen to deprive your brain of oxygen, carbon monoxide not only competes with oxygen for free hemoglobin, but actually displaces oxygen that is bound to it. This is why it can kill a person in as little as three minutes. The image below demonstrates this.



Carbon monoxide displacing oxygen and carbon dioxide from hemoglobin. (University of Virginia Health Center)

A full description of the health effects of CO can be found in the following [CDC report](#) [4].

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Source URL: <https://www.acsh.org/news/2016/01/27/why-carbon-monoxide-is-so-dangerous>

Links

[1] <http://www.nydailynews.com/news/national/mom-son-die-waiting-car-tailpipe-blocked-snow-article-1.2507972>

[2] <http://www.csb.gov/hazards-of-nitrogen-asphyxiation/>

[3] <http://www.nchh.org/Portals/0/Contents/Article0362.pdf>

[4] <http://ephtracking.cdc.gov/showCoRisk.action>