

# Carbon Monoxide vs. Air

## Where to Install a Carbon monoxide Alarm?

| Gas or Vapor                             | Molecular Weight | Specific Gravity |
|--|------------------|------------------|
| Acetylene, C <sub>2</sub> H <sub>2</sub> | 26.040           | 0.900            |
| <b>Air</b>                               | <b>28.966</b>    | <b>1.000</b>     |
| Ammonia                                  | 17.020           | 0.590            |
| Argon, Ar                                | 39.948           | 1.380            |
| Benzene                                  | 78.110           | 2.696            |
| Butadiene                                | 54.090           | 1.870            |
| Butane, C <sub>4</sub> H <sub>10</sub>   | 58.120           | 2.006            |
| Carbon Dioxide, CO <sub>2</sub>          | 44.010           | 1.519            |
| <b>Carbon Monoxide, CO</b>               | <b>28.011</b>    | <b>0.967</b>     |
| Chlorine                                 | 70.906           | 2.486            |
| Deuterium                                | 2.014            | 0.070            |
| Ethane, C <sub>2</sub> H <sub>6</sub>    | 30.070           | 1.038            |
| Ethyl Chloride                           | 64.515           | 2.230            |
| Ethylene, C <sub>2</sub> H <sub>4</sub>  | 28.054           | 0.968            |
| Fluorine                                 | 37.996           | 1.310            |
| Helium, He                               | 4.020            | 0.138            |
| Hexane                                   | 86.170           | 2.973            |
| Hydrogen Chloride                        | 36.461           | 0.070            |
| Hydrogen Sulfide                         | 34.076           | 1.268            |
| Hydrogen, H <sub>2</sub>                 | 2.016            | 1.176            |
| Isobutene                                | 56.108           | 1.940            |
| Krypton                                  | 83.800           | 2.890            |
| Methane, CH <sub>4</sub>                 | 16.044           | 0.554            |
| Methyl Chloride                          | 50.488           | 1.740            |
| Natural Gas                              | 19.000           | 0.650            |
| Neon, Ne                                 | 20.179           | 0.697            |
| Nitric Oxide, NO <sub>2</sub>            | 30.006           | 1.037            |
| <b>Nitrogen, N<sub>2</sub></b>           | <b>28.013</b>    | <b>0.972</b>     |
| Nitrous Oxide                            | 44.012           | 1.530            |
| Octane                                   | 114.220          | 3.944            |
| Oxygen, O <sub>2</sub>                   | 31.999           | 1.104            |
| Ozone                                    | 47.998           | 1.660            |
| Pentane                                  | 72.150           | 2.487            |
| Propane, C <sub>3</sub> H <sub>8</sub>   | 44.097           | 1.522            |
| Propylene                                | 42.080           | 1.452            |
| Sulfur Dioxide                           | 64.060           | 2.264            |
| Toluene                                  | 92.130           | 3.108            |
| Water Vapor - Steam, H <sub>2</sub> O    | 18.020           | 0.622            |
| Xenon                                    | 131.300          | 4.530            |

Air has a molecular weight of 28.966. Gases with molecular weights less than 28.966 are lighter than air. Gases with a weight higher than 28.866 are heavier than air. Air is made up of 78% Nitrogen and 21% Oxygen - Nitrogen has a weight of 28.013 while Carbon Monoxide (CO) has a weight of 28.011. CO mixes with Air as their weights are approximately the same.

The National Fire Protection Association Standard - NFPA 720-2009 states "**A.9.4.1.2** *The location for effective performance is not generally dependent on mounting height. The density of carbon monoxide is similar to that of air at room temperature, and carbon monoxide generally mixes readily with air.*"

Underwriters Laboratories, UL 2034 - Standard for Single and Multiple Station Carbon Monoxide Alarms - *does not include any requirements or tests for CO alarms installed at specific heights.*

**Answer: CO alarms can be installed at any height. All major manufacturers of CO alarms installed in homes have direct plug in the outlet models.**