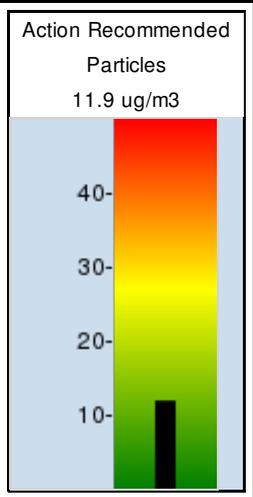


# HEALTH

## Particles



**Health Concerns** Particles are generally a cause for concern when daily average levels are above 10 ug/m3. Particles are known to trigger asthma and allergy symptoms. At levels above 35 ug/m3, they can harm normally healthy adults by causing emphysema and diminished lung capacity. Children, the elderly, and pregnant women are more susceptible.<sup>a</sup>

**What We Found In Your Home** Particle levels were between 11-35 ug/m3.

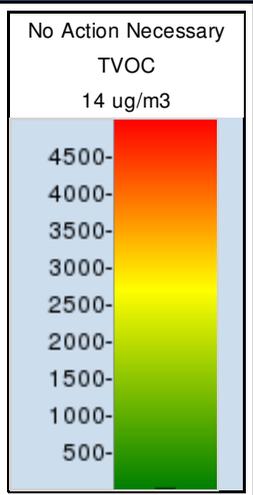
**Potential Causes** Particles can build up to unhealthy levels due to three primary causes:

- Activities in the home
- Presence of excessive particulate sources
- Heating and cooling system issues

### Recommended Actions

- Replace filters or upgrade filtration system
- Inspect and clean duct work
- Use the exhaust fan during cooking
- Install UV light in cooling coil to prevent mold

## Chemicals



**Health Concerns** Chemical pollutants are generally a cause for concern when average levels are above 500 ug/m3 (micrograms per cubic meter of air). Chemical pollutants are known to trigger asthma and allergy symptoms. At moderate levels, eyes and nasal passages can be irritated. Some people can experience nausea and headaches. At very high levels, they can even affect normally healthy adults by overworking the liver and kidneys. Children, the elderly, and pregnant women are more susceptible.<sup>b</sup>

**What We Found In Your Home** Chemical pollutant levels were below 500 ug/m3.

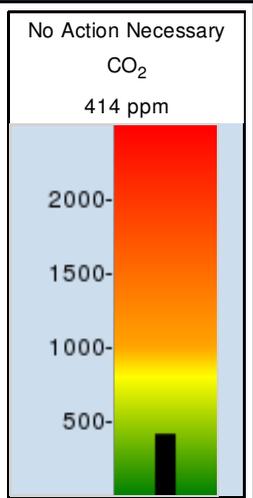
**Potential Causes** Levels can build up in your home's air due to usage of chemical products and heating/cooling system issues:

- Sources: Off-gassing from building materials, carpeting, furniture and other synthetic materials, fuel fumes, scented products and air fresheners, personal care products, household products such as paint, glue, and plastics
- Possible heating & cooling issues: Lack of fresh air introduced into home (either inadequate mechanical ventilation or none present), no chemical pollutant removal equipment

### Recommended Actions

- Minimize use of VOC sources such as air fresheners, open cleaning fluids, or candles

## Carbon Dioxide



**Health Concerns** Carbon dioxide (CO<sub>2</sub>) levels above 750 ppm (parts per million) are a cause for concern. At higher levels, CO<sub>2</sub> inside a home can contribute to what the EPA terms "sick building syndrome," which leads to fatigue, headache, breathing difficulties, nausea, strained eyes and itchy skin. At even higher levels, CO<sub>2</sub> can cause asphyxiation as it replaces oxygen in the blood. CO<sub>2</sub> poisoning, however, is very rare. The U.S. EPA recommends a maximum concentration of CO<sub>2</sub> of 1000 ppm (0.1%) for continuous exposure.<sup>c</sup>

**What We Found In Your Home** Carbon dioxide levels were below 750 ppm.

**Potential Causes** Elevated carbon dioxide levels can occur in the home due to source causes, home heating & cooling system issues, or both:

- Sources: 'Tight' (well weatherized and energy-efficient) home construction without adequate ventilation, common human & household activity (breathing, and burning candles, gas, wood, or other combustion)
- Possible heating & cooling issues: Lack of supplied fresh air (no ventilation), malfunctioning ventilation, ventilation shut off by occupant, HVAC equipment needs repair or service

### Recommended Actions

- Use the exhaust fan during cooking
- Inspect combustion sources, such as fireplaces, gas heaters, or gas stoves, for proper ventilation

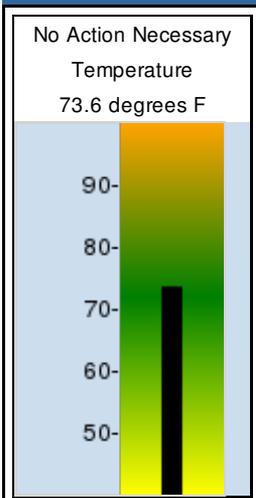
a. Source: American Lung Association, Environmental Protection Agency (EPA); Indoor Air Quality Association.

b. Sources: European Union (EU); Leadership in Energy & Environmental Design (LEED); Environmental Protection Agency (EPA).

c. Source: EPA, Minnesota Dept of Health.

# COMFORT

## Temperature



**Comfort Concerns** Comfortable temperatures fall within the range of 68 and 75 degrees F. In addition temperatures are most comfortable when steady, with fluctuations less than 1-1/2 degrees. Ideally, temperature should be constant between all areas of the home. People experience a chilling or 'goose bump' sensation when temperatures are uneven and when air blows quickly across the surface of the skin.<sup>a</sup>

**What We Found In Your Home** The temperature level was inside the normal range.

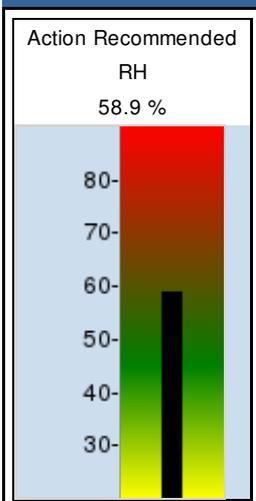
**Potential Causes** Fluctuating and/or low and high temperatures can occur due to structural causes and/or home heating & cooling system issues:

- Structural causes: Poor insulation, inadequate weatherization (for example, poorly sealed windows and doors create drafts)
- Possible heating and cooling issues: Thermostat poorly located (in an area where air supply falsely influences readings), uneven heating or cooling from room to room due to imbalanced ductwork or inadequate or poorly sized equipment

**Recommended Actions**

- Upgrade to programmable thermostat for energy efficiency

## Relative Humidity



**Comfort Concerns** According to the ALA the relative humidity should be 50 %, with levels in the 40-50 % range offering the most comfort possible. The amount of moisture in the air influences both health and comfort. When air is too dry in the winter, people typically feel colder. Also, respiratory passages can become irritated and prone to infection.<sup>b</sup>

**What We Found In Your Home** The relative humidity levels were outside the normal range.

**Potential Causes** Fluctuating and/or low and high relative humidity can occur due to structural causes and/or home heating & cooling system issues:

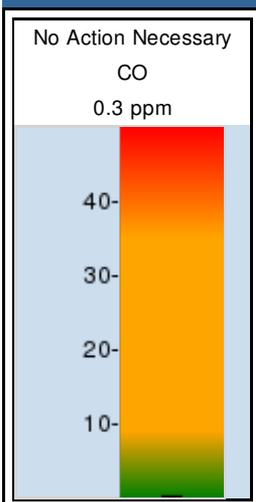
- Structural causes: Standing water in basement or other areas, leaky pipes/faucets, inadequate ventilation in winter (causes moisture build-up inside), and home is under "negative pressure" (pulls dry or moist air in from outside)
- Possible heating & cooling system issues: no or inadequate humidification or ventilation, improperly sized cooling system (prevents dehumidification), HVAC equipment needs repair (condensate drain or coil malfunctioning)

**Recommended Actions**

- Install a humidification or dehumidification system
- Operate bathroom fans
- Use the exhaust fan during cooking

# SAFETY

## Carbon Monoxide



**Safety Concerns** Carbon monoxide is a cause for concern when average levels are 6 ppm or higher. When levels are above 25 ppm, immediate action should be taken. Carbon monoxide is a colorless, odorless, poisonous gas produced by combustion. When people are exposed to relatively low levels, it can cause headaches and nausea. At relatively high levels it can cause memory problems and ultimately death.<sup>c</sup>

**What We Found In Your Home** Carbon monoxide levels were below 6 ppm.

**Potential Causes** Elevated carbon monoxide can occur due to source causes, home heating & cooling system issues, or both:

- Sources: Fireplaces, cooking, combustion appliances (water heater, gas dryer, stove), vehicles running in attached garage
- Possible heating & cooling system issues: Cracked heat exchanger on furnace, leaking chimney or vent, inadequate exhausting of a combustion appliance (water heater, gas dryer, stove)

**Recommended Actions**

- Install or check CO alarm

a. Source: American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).

b. Source: American Society of Heating, Refrigeration and Air Conditioning Engineers; Health Canada; Washington Department of Health.

c. Source: US Environmental Protection Agency; World Health Organization (WHO); Indoor Air Quality Association (IAQA).