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COMBUSTION POLLUTANTS

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What are Combustion Pollutants?

Combustion pollutants are gases or particles that come from the burning of fuels:
- Natural or LP (liquified petroleum) gas
- Wood
- Oil
- Kerosene
- Coal

Combustion pollutants are sometimes called combustion by-products because they are produced by the burning of all fossil fuels. Combustion pollutants also come from burning tobacco. Specific combustion pollutants that are of most concern in your home are the following:
- Carbon monoxide - an odorless gas that can kill.
- Nitrogen dioxide - gas that can damage the respiratory tract.
- Sulfur dioxide - gas that irritates the eyes, nose, and respiratory tract.
- Particulates - tiny particles that make up smoke and irritate the eyes, nose, and throat.

Health Effects of Combustion Pollutants

Health effects from exposure to combustion pollutants vary from very mild to lethal. Typical health effects are:
- Headaches
- Dizziness
- Sleepiness
- Nausea
- Irritated eyes
- Breathing difficulties
- Respiratory problems (such as cancer and coughing)

People with allergies, asthma, or chronic respiratory or heart problems are particularly susceptible to health effects from combustion pollutants. It is important to note, though, that these health effects may be caused from other sources besides combustion pollutants.

The combustion pollutant carbon monoxide (CO) is of the greatest concern because it can be fatal. Hundreds of people are killed each year by CO in their homes. Carbon monoxide can build up in an

enclosed space and it is odorless and colorless, so you may not be able to sense what is making you sick. Carbon monoxide reduces the ability of hemoglobin in the blood to carry oxygen. Health effects or symptoms of CO poisoning can be similar to other illnesses, such as the flu or allergies.

Lower doses of CO: Nausea, dizziness, weakness, muscle ache. Higher doses of CO: Impaired judgment, paralysis, coma, death

Sources of Combustion Pollutants

Combustion pollutants in the home come from a variety of sources:

- Heating or cooking appliances that burn fossil fuels:
  - Gas, oil, coal, or wood furnaces or boilers
  - Gas or oil water heaters
  - Gas or kerosene space heaters
  - Fireplaces and wood or coal stoves
  - Gas ranges and ovens
  - Gas clothes dryers
- Tobacco smoking
- Exhaust from automobile engines operating in attached garages
- Other equipment with internal combustion engines, such as lawn mowers or generators
- Other combustion/burning activities, such as welding or soldering
- Gas or charcoal grills and hibachis

A condition known as backdrafting can increase the danger from combustion pollutants. Backdrafting occurs when there is negative pressure in the home, which causes combustion by-products to spill into the room rather than exhaust to the outside. This scenario is most likely to occur in "tight," well constructed, energy efficient homes that do not have controlled ventilation.

To prevent backdrafting of combustion pollutants in your home:

- Keep all combustion equipment, flues, and chimneys in top working order
- Do not use an exhaust fan in the same area where a naturally-vented combustion appliance is operating
- Select closed combustion or draft-induced combustion equipment, or provide an outside air source for combustion appliances, especially in tightly constructed homes
- Do not implement air-tightening measures, such as caulking, weather stripping, insulation, or new/improved windows, without investigating potential impacts on the operation of combustion equipment

Detection of Combustion Pollutants

Consider the installation of a carbon monoxide alarm with an audible warning. A CO alarm will alert you to dangerous, high levels of carbon monoxide, and give you time to vacate or ventilate the home. Depending on the type of CO alarm, it may not detect low levels of CO that can still make you ill. *A CO alarm does not replace regular maintenance, inspection, and safe operation of combustion equipment!*

Combustion pollutants of indoor air may be the source of health problems when:

- Symptoms occur only in the home

- Symptoms improve when you leave the home
- More than one person in the home has similar symptoms
- Your home has one or more of the following five air quality problems
  - Pollutants from combustion equipment are not exhausted to the outside of the home
  - Combustion equipment is not maintained in good working order
  - Combustion equipment is not regularly inspected for safe operation
  - Air pressure indoors is lower than outdoors, preventing safe exhaustion of combustion pollutants
  - Tobacco smoking is permitted in the home

Every piece of equipment or activity in the home that involves combustion or burning of fossil fuels has the potential to introduce combustion air pollutants.

Reducing Combustion Pollution

First...*Keep all combustion equipment well-maintained and inspected for safety.*
Experts recommend combustion heating systems, such as furnaces and boilers, be inspected by a trained professional *every year* prior to the heating season for the following:

- Blocked or clogged openings to flues and chimneys
- Excessive production of carbon monoxide
- Cracked, separated, or disconnected flue pipes
- Dirty filters (clean or replace monthly)
- Rust or cracks in the heat exchanger
- Soot, corrosion, or creosote buildup
- Burner/flame adjustment
- Exhaust or gas odors

Always operate combustion equipment safely, according to directions, and for its intended purpose. For example, never use an oven or clothes dryer as a space heater, or never use a charcoal grill inside the house. Have combustion equipment installed correctly by a trained installer and according to local safety codes.

Second...*Exhaust all combustion pollutants to the outside of the home.*

- Avoid the use of unvented combustion appliances inside the home, such as kerosene or gas space heaters.
- Do not disconnect vents on combustion appliances, even if it seems like a way to get extra heat in the winter.
- Use an exhaust fan ducted to the outside to provide spot ventilation if a combustion appliance is not vented directly outside; always use an exhaust fan when operating a gas range or oven.
- When purchasing new combustion appliances, look for sealed combustion units that use outside air for combustion and then exhaust it back outside; therefore, combustion pollutants are never mixed with room air.

Third...*Maintain an adequate pressure balance between the home and the outside.*

- Provide an outside air source for combustion equipment
- Consider opening a window slightly when operating an exhaust fan

Fourth...*Do not allow tobacco smoking in your home.*

- Secondhand smoke contains over 4,000 chemicals, 200 of which are known poisons, 40 of which

could cause cancer

- Secondhand smoke can be an irritant to the body—it can cause other acute and chronic health problems
  - increases irritation of eyes, nose, and throat
  - lung irritation can cause coughing, excess phlegm, chest discomfort, and reduced lung capacity
  - could increase risk factors for heart disease
  - causes serious health problems in children

Source: Healthy Indoor Air for America's Homes (3rd ed.), Combustion Pollutants in the Home Instructional Module and Secondhand Smoke Instructional Module. Funding for this brochure from Healthy Indoor Air for America's Homes: CSREES, EPA, MSU.

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