



## BENZENE IN INDOOR AIR

Benzene is one of a diverse group of chemicals known as volatile organic compounds (VOCs), which can be released as a gas into indoor air at room temperatures. Most of our exposure to benzene occurs indoors; this is because levels indoors are higher compared to outdoors and because most of our time is spent indoors. Attached garages, when present, are the major indoor source of benzene because vehicle exhaust and evaporative emissions from gas-powered equipment can enter the home. Smoking is also a significant contributor to indoor benzene levels.

Indoor concentrations of benzene measured in studies cannot be explained by the known sources alone. There may be other unidentified sources in homes.

### What are the health effects of benzene?

Exposure to benzene has been linked to dizziness, tremors, nausea, vomiting, headache, and drowsiness after minutes of exposure to high levels not observed in residential environments. Long-term exposure to benzene, even at low concentrations, causes progressive deterioration in hematopoietic function including bone marrow damage, changes in circulating blood cells, and altered immune response.

Benzene is also a carcinogen for which there is no evidence of a threshold. Chronic exposure to benzene has been shown to cause leukemia, a cancer of the blood or bone marrow, in industrial workers; and leukemia and lymphomas in laboratory rats and mice.

The real cancer risk from benzene in most Canadian homes, while not always negligible, is very low. Environmental levels are at least three orders of magnitude lower than occupational levels associated with leukemia in workers, and conservative assumptions were used when extrapolating from the risks of these workers, to the risks from benzene present in Canadian homes.

### How can you reduce benzene levels indoors?

By following these simple steps you will not only reduce benzene levels in your home but you will also reduce the levels of other pollutants and will improve your indoor air quality:

- Make sure that there is an appropriate seal between the home and the garage, particularly for any door that connects the two. This can be achieved by providing an appropriate air barrier and a sealer door between the garage and the house, and dry walling shared walls between the garage and the house. These actions will also reduce the air exchange and the migration of pollutants from your garage to your home.
- Install an exhaust fan in the attached garage.
- Do not idle vehicles in the attached garage.
- Do not start gas-powered equipment in the attached garage.
- Do not smoke inside the home or the attached garage.

Where possible, consider removing solvents and gasoline-powered tools and engines from attached garages, since most small engines do not have emission controls on evaporative releases.

### What are Health Canada's recommended levels for benzene indoors?

Health Canada's Residential Indoor Air Quality Guidance Document for benzene recommends that individuals take action to reduce indoor exposure to benzene as much as possible.

Measures to control known indoor sources may reduce benzene concentrations such that the risk to residents is very low. As further sources are identified and effective control measures developed, Health Canada will incorporate additional recommendations on reducing benzene levels in its communications to health and building professionals and the public.

## **What are Residential Indoor Air Quality Guidelines and Guidance Documents?**

The Residential Indoor Air Quality Guidelines are Health Canada's assessment of the health risks posed by an indoor air pollutant, based on a review of the best scientific information available. They summarize the known health effects, describe indoor sources and levels, and provide a recommended exposure level below which health effects are unlikely to occur. When a numerical exposure limit cannot be determined, a Residential Indoor Air Quality Guidance Document is developed that focuses on actions to reduce exposure.

The Guidelines and Guidance Documents are recommendations only and are not an enforceable standard under any regulation. They are meant to serve as a scientific basis for activities to reduce the risk from indoor pollutants. This could include the development of regulations or standards or the production of communication materials aimed at the general public.

## **Where do I go for more information?**

Health Canada's Residential Indoor Air Quality Guidelines and Guidance documents can be obtained from [www.hc-sc.gc.ca/ewh-semt/air/in/res-in/index-eng.php](http://www.hc-sc.gc.ca/ewh-semt/air/in/res-in/index-eng.php) or by contacting Health Canada at: [air@hc-sc.gc.ca](mailto:air@hc-sc.gc.ca).

For information on volatile organic compounds please visit <http://www.hc-sc.gc.ca/ewh-semt/air/in/poll/construction/organi-eng.php>.

If you have any questions about the Guidelines, the Guidance documents or would like to discuss using them in your work please contact Health Canada at: [air@hc-sc.gc.ca](mailto:air@hc-sc.gc.ca).

© Her Majesty the Queen in Right of Canada, represented by the Minister of Health, 2013

Cat.: H144-14/1-2013E-PDF  
ISBN: 978-1-100-23025-2