



Ethylbenzene and Health

Issue

Ethylbenzene is a constituent of gasoline and a solvent used in consumer products. Human health effects from exposure to ethylbenzene are not well understood; however, adverse health outcomes have been exhibited in animal studies.

Background

Ethylbenzene belongs to a group of chemicals called “BTEX compounds”, which also includes benzene, toluene and xylene. These are volatile organic hydrocarbons, which are water soluble and are mostly non-persistent in the environment, although they are believed to be persistent in air.

Ethylbenzene is widely used in the chemical industry in the production of polystyrene foam. It is used in paints, lacquers, adhesives, inks, and cleaning materials, and in the production of dyes, perfumes, plastics, pharmaceuticals, and pesticides. Ethylbenzene is a natural component of petroleum, and is therefore found in gasoline.

Sources

Sources of ethylbenzene to the atmosphere include petroleum and coal refining, vehicle emissions, and evaporation from solvents and thinners. Ethylbenzene may be released to the air through the use of consumer products such as solvents, enamel brush paints and spray paints, stains and varnishes. It may be released to soil and water from leaking underground gasoline storage tanks, landfill sites, spills during transportation, pesticide use, and discharges of industrial and municipal waste. Ethylbenzene is also found in tobacco and wood smoke.

Ethylbenzene can be very mobile when released into the environment, and quickly and easily moves into air from other sources. There are four main routes that ethylbenzene may take within the environment.

- Ethylbenzene easily evaporates from soil into the atmosphere, depending on factors such as temperature and humidity.
- Ethylbenzene binds well to some soils, especially soils rich in organic matter. Clay minerals also bind ethylbenzene.
- Ethylbenzene is converted into carbon dioxide and water when soil microbes degrade it. Degradation occurs in both oxygen-rich and oxygen-poor conditions.
- Ethylbenzene is moderately soluble in water, so rainwater leaching through the ground can carry ethylbenzene with it into the groundwater, or contamination may occur from industrial run-off or improperly maintained underground storage tanks.

As a result of its widespread use, there are many potential sources of exposure for the Canadian population. Ethylbenzene has been detected in outdoor air, indoor air, drinking water, soil and food; however according to Health Canada’s draft screening assessment report, the greatest exposure is via indoor air. Studies in the United States have reported that commuting in an automobile in heavy traffic can also result in elevated ethylbenzene exposure.

Health Risks

The health effects of exposure to ethylbenzene are not well understood, although adverse outcomes associated with airborne ethylbenzene have been demonstrated in animal studies. High concentrations of ethylbenzene have been shown to cause liver and lung cancer in mice and kidney cancer in rats. An assessment by the International Agency for Research on Cancer concluded that ethylbenzene was *possibly carcinogenic* to humans, based on sufficient evidence in experimental animals and inadequate evidence in humans. Adverse health effects in animals occurred at much higher levels than those to which Canadians are generally exposed.

Special vulnerabilities of children have not been established; however, tests on animals have demonstrated increased incidence of birth defects among pregnant females exposed to airborne ethylbenzene.

Ethylbenzene is rarely used alone. Many of the acute non-carcinogenic health effects associated with ethylbenzene exposure have been ascribed to the mixed xylenes with which it is found in technical grade solvents that are used in industrial and consumer products.

Testing for ethylbenzene exposure is primarily through urinalysis, although it can also be present in the blood and some body tissues. While ethylbenzene has a moderate attraction to fats, Environment Canada’s draft screening assessment report states that it does not bioaccumulate (build up).

Minimizing Your Risk

There are many steps that can be taken to minimize exposure to ethylbenzene.

- Following new carpet installation or painting indoors with enamel paint, stain or varnish, ensure adequate ventilation of the area.
- Do not store gasoline in your basement.
- To the extent possible, keep products in original packaging which contains product safety labeling, and keep hazardous products out of reach of children.

For some youth, volatile hydrocarbons like ethylbenzene can provide a “high”, and gasoline sniffing is a problem in some communities in Canada. Educating your children on related health risks will help provide them with the information necessary to make a responsible decision.

Role of Governments

The *Canadian Environmental Protection Act, 1999* (CEPA 1999), is the primary federal legislation that deals with toxic substances in the environment.

Ethylbenzene met the categorization criteria under section 73 of CEPA 1999 and has been identified as being a priority for screening-level risk assessment. It is currently undergoing a risk assessment, and a State of the Science report has been prepared and is available on the Health Canada website.

Need More Info?

More information can be found at www.chemicalsubstances.gc.ca

Health Canada's State of the Science Report for Ethylbenzene
www.hc-sc.gc.ca/ewh-semt/pubs/contaminants/existsub/ethylbenzene/index_e.html

Canadian Soil Quality Guidelines: Ethylbenzene
www.ec.gc.ca/ceqg-rcqe/English/Html/GAAG_EthylbenzeneSoil_e.cfm

Alberta Ambient Air Quality Objectives: Ethylbenzene
www.gov.ab.ca/env/air/ogs/objexisting.html

Agency for Toxic Substances and Disease Registry's ToxFAQ for Ethylbenzene
www.atsdr.cdc.gov/tfacts110.html

UNEP Environmental Health Criteria 186: Ethylbenzene
www.inchem.org/documents/ehc/ehc/ehc186.htm

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