



Benzene

Health Effects and Reducing Exposure



Learning Objectives

- Describe characteristics and identify sources of benzene
- Discuss health effects of benzene
- Determine actions for reducing exposures to benzene



Uses and Sources

- Colorless liquid, sweet odor, evaporates quickly, highly flammable
- Found at 813 National Priority List Sites
- Produced during the burning of gasoline, cigarettes, volcanoes, and forest fires
- Used in plastics, resins, nylon, and synthetic fibers, some rubbers, lubricants, dyes, detergents, drugs, pesticides



How Are We Exposed?

- Inhalation
 - Gasoline vapors
 - Cigarette smoke (first and second hand)
 - Vapors from contaminated steam during showering or cooking
- Ingestion
 - Contaminated groundwater
- Skin contact

Health Effects: Acute Inhalation

- Drowsiness
- Dizziness
- Fast heart rate
- Headache
- Tremors
- Confusion
- Unconsciousness
- Death



Health Effects: Ingestion – High Level

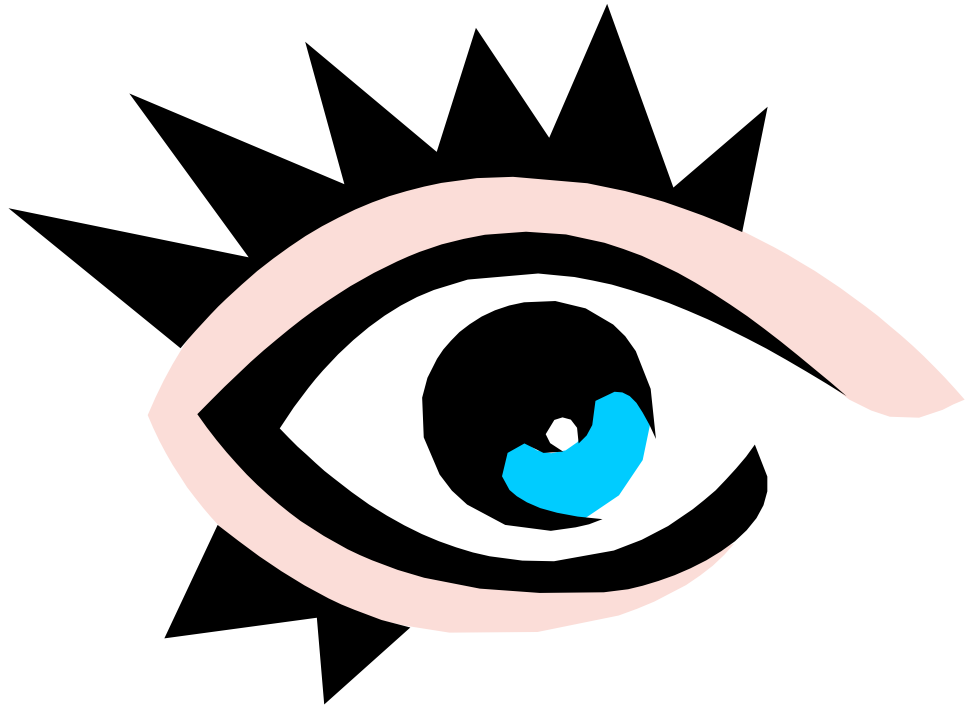
- Food or water
 - Nausea/vomiting
 - Stomach irritation
 - Dizziness
 - Sleepiness
 - Convulsions
 - Fast heart rate
 - Death





Health Effects: Skin Contact

- Redness
- Sores
- Eye irritation





Health Effects: Chronic

- Decreased blood production
- Inability to fight infection
- Cancer: Acute myeloid leukemia
- Low birth weight
- Delayed fetal bone formation
- Injury to reproductive organs leading to infertility and difficulty getting pregnant



Indication of Exposure

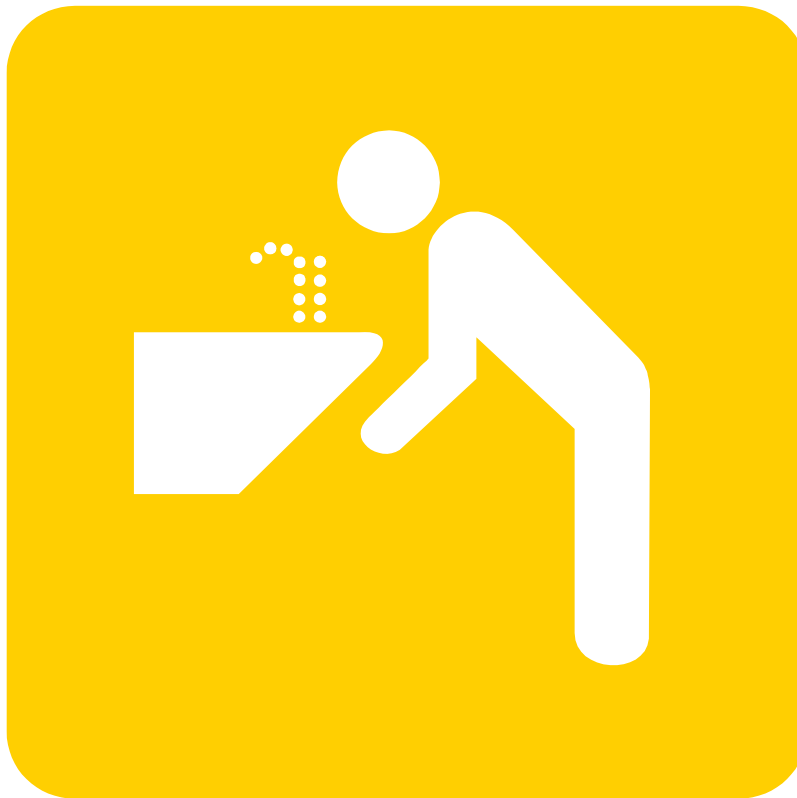
- Breath test – only useful shortly after exposure, cannot detect low levels
- Blood and bone marrow – only indicates recent exposures
- Urine for benzene breakdown products, such as phenol – may not be specific for benzene exposure



How to Reduce Risk

- Avoid breathing or ingesting vapors
- Wear protective respiratory equipment and gloves
- Ensure adequate ventilation where fumes are present
- If exposed at work
 - Wash immediately and before going home
 - Change clothes at work, launder separately

Policy



- EPA Maximum Contaminant Level
 - Water: 5 parts per billion (ppb)
 - Air: 0.4 ppb
 - Goal for both air and water: 0 ppb



Policy

- OSHA 8 hour day/40 hour week limit for air exposure is 1 part per million (ppm) with a short-term air exposure limit of 5 ppm
- NIOSH recommends use of special respiratory equipment when handling benzene



Resources

- ATSDR fact sheet

www.atsdr.cdc.gov/tfacts3.pdf

- NJ fact sheet

www.state.nj.us/health/eoh/rtkweb/1929.pdf



In Review

- What is benzene and how are we exposed to it
- How does benzene effect our health
- How can we reduce our exposure to benzene



References

- Agency for Toxic Substances and Disease Registry (1997). Benzene. Public Health Statement. Available on-line: <http://www.atsdr.cdc.gov/toxprofiles/phs3.html>
- Churchill, J., & Kaye, W. (2001). Recent chemical exposures and blood volatile organic compound levels in a large population-based sample. Archives of Environmental Health, 56(2); 157-166.
- New Jersey Department of Health and Senior Services (2001). Benzene. Hazardous Substance Fact Sheet. Available on-line: <http://www.state.nj.us/health/eoh/rtkweb/0197.pdf>