

## Sources of Exposure

## Toxicokinetics and Normal Human Levels

## Biomarkers/Environmental Levels

### General Populations

- Exposure may occur by inhalation of contaminated air or ingestion of contaminated water. These levels may be higher near municipal waste incinerators, coal and petroleum fueled facilities or hazardous waste sites.
- Exposure can occur by ingestion of minute amounts present in some foods and drinks.
- Cresols are used as disinfectants and deodorizers.
- Cigarette smoke is a source of cresols for smokers and for those who inhale second hand smoke.

### Occupational Populations

- Workers involved in the manufacture of cresols or of consumer products that contain cresols.
- Workers routinely involved in the combustion of coal or wood may be exposed to higher levels of cresols than the general population.
- Workers at gas stations or those involved in distillation of crude tar or oil.

### Toxicokinetics

- Cresols can be absorbed by the inhalation, oral, and dermal routes of exposure, but quantitative data are lacking.
- Cresols were found in blood, liver, and brain in a case of accidental dermal exposure; no additional information is available in humans.
- Limited data in animals suggest that cresols can distribute throughout the body.
- In animals, cresols undergo oxidative metabolism in the liver and are rapidly eliminated in the urine as sulfate and glucuronide conjugates.
- Cresols have been found in the urine of workers occupationally-exposed to cresols.
- Cresols do not accumulate in the body.

### Normal Human Levels

- Mean of 0.93 mg/L *p*-cresol in serum of healthy subjects not occupationally exposed. No data are available for other isomers.

### Biomarkers

- No studies were located regarding levels of cresols or its metabolites in human tissues and fluids associated with effects.
- Cresols are not specific biomarkers of exposure to cresols because they are also formed as breakdown products of toluene and tyrosine.

### Environmental Levels

#### *Air*

- Median concentration of 1.5 µg/m<sup>3</sup> *o*-cresol, range 0.5–20 µg/m<sup>3</sup> *p*-cresol, at 11 unspecified sites in the U.S. in 1994.

#### *Sediment and Soil*

- Maximum of 4,800 mg/kg *p*-cresol in stream bed sediment in 20 major river basins in the U.S. from 1992 to 1995.

#### *Water*

- Typically ≤1 µg/L when detected in surface water.

### Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2008. Toxicological Profile for Cresols. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

# ToxGuide™ for Cresols



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U.S. Department of Health and  
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Public Health Service  
Agency for Toxic Substances  
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[www.atsdr.cdc.gov](http://www.atsdr.cdc.gov)

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## Chemical and Physical Information

## Routes of Exposure

## Relevance to Public Health (Health Effects)

### Cresols are Solids

- There are three cresol (methyl phenol) isomers: *o*-cresol, *m*-cresol, and *p*-cresol. They can be found separately and together in mixtures.
- Cresols are both natural and man-made products.
- Cresols are present in wood and tobacco smoke, crude oil, and coal tar.
- In their pure form, cresols are colorless solids. Mixtures tend to be liquid.
- Cresols are moderately soluble in water and soluble in most organic solvents.
- Cresols have a medicinal smell and when dissolved in water they give it a medicinal smell and taste.
- Cresols are used as disinfectants and deodorizers, as solvents, and as starting chemicals in the manufacture of other chemicals.

- Inhalation – Predominant route of exposure for the general population. Also, route of exposure for workers during use of products containing cresols.
- Oral – Some foods and drinks contain cresols. Also, important route of exposure at or near waste sites via ingestion of contaminated media.
- Dermal – Use of disinfectants and deodorizers by the general population and of other products that contain cresols by workers. Bathing or showering with water contaminated with cresols.

### Cresols in the Environment

- Cresols enter the air, water, and soil as a result of its manufacture and use.
- In air, cresols quickly break down into other chemicals by reaction with hydroxyl or nitrate radicals.
- Cresols evaporate slowly from soil and water surfaces, but can be quickly degraded by bacteria.
- Cresols do not attach strongly to soil and may move to groundwater.
- In soil, the half-life is about 1 week.
- Cresols do not accumulate in fish or other organisms.

Health effects are determined by the dose (how much), the duration (how long), and the route of exposure.

### Minimal Risk Levels (MRLs)

#### Inhalation

- No acute-, intermediate-, or chronic-duration inhalation MRLs were derived for cresols.

#### Oral

- No acute-duration oral MRL was derived for cresols.
- An MRL of 0.1 mg/kg/day has been derived for intermediate-duration oral exposure ( $\leq 15$ -364 days) to *o/m/p*-cresol.
- An MRL of 0.1 mg/kg/day has been derived for chronic-duration oral exposure ( $\geq 365$  days) to *o/m/p*-cresol.

### Health Effects

- High concentrations of cresols in the air cause respiratory irritation.
- In rats and mice, oral exposure to *p*-cresol or a mixture of *m/p*-cresol caused lesions in the nasal epithelium.
- Ingestion of high concentrations of cresols can produce internal burns.
- Application of cresols to the skin can cause corrosive damage to the skin.
- Acute oral or dermal exposure to high amounts of cresols can induce signs of neurotoxicity including coma.
- Based on inadequate data in humans and limited data in animals, the EPA has classified cresols as possible human carcinogens.

### Children's Health

- Children exposed to cresols probably would experience the same effects as adults.
- It is not known whether children are more susceptible to cresols poisoning than adults.