Ethylbenzene (C_6H_5-C_2H_5) C 1

Information and recommendations for doctors at hospitals/emergency departments

- **Patients exposed only to ethylbenzene vapor do not pose a significant risk of secondary contamination. Patients whose clothing or skin is contaminated with liquid ethylbenzene (boiling point 136°C, 277°F respectively) can secondarily contaminate rescue and medical personnel by direct contact or evaporation of ethylbenzene.**
- **Ethylbenzene is irritating when it comes in contact with the eyes, skin, and throat and causes headache, nausea, vertigo, dizziness, weakness, disorientation, and unconsciousness.**
- **There is no antidote to be administered to counteract the effects of ethylbenzene. Treatment consists of supportive measures.**

1. Substance information

Ethylbenzene (C_6H_5-C_2H_5), CAS 100-41-4

Synonyms: phenylethane

Ethylbenzene is, at room temperature, a colorless to yellow liquid with a boiling point of 136°C, 277°F, respectively. Both vapor and liquid are potential fire and explosion hazards. Ethylbenzene has an aromatic odor at air concentrations of 2.3 ppm. It is slightly soluble in water, but miscible with alcohol and ether. Carbon monoxide may be released in a ethylbenzene fire.
Ethylbenzene is an organic solvent, used as an intermediate in the production of styrene, and in the plastics and rubber industries.
Ethylbenzene is usually present in complex mixtures such as gasoline.

2. Routes of exposure

Inhalation — **Most exposures occur by inhalation.** Ethylbenzene is readily absorbed by the respiratory tract.

Skin/eye contact — It is absorbed through the skin causing systemic effects

Ingestion — Ethylbenzene is absorbed from the gastrointestinal tract. However, ingestion is uncommon in occupational settings, but may be aspirated.

3. Acute health effects

Systemic — **Ethylbenzene causes headache, nausea, vertigo, dizziness, weakness, disorientation, and unconsciousness.** Acute exposure to high concentrations may produce signs of upper respiratory irritation, followed by asphyxia, muscular weakness, coma and death from respiratory failure. Damage to liver may occur after chronic exposure.

Respiratory — Ethylbenzene is irritating to the upper respiratory tract.

Dermal — Irritation of the skin may be caused by direct contact to liquid ethylbenzene.

Ocular — Eye contact to vapor or liquid ethylbenzene causes burning discomfort, spasmodic blinking or involuntary closing of the eyelids, redness, and tearing.

Dose-effect relationships — Dose-effect relationships are as follows:

Ethylbenzene concentration		Effect
2.3 ppm	-	Odor threshold
100 ppm	-	TTL-TWA (8-h average),
125 ppm	-	STEL (short-term exposure)
200 ppm	-	transient eye irritation, lacrimation

800 ppm	-	IDLH (immediate dangerous for life and health)
2,000 ppm	-	dizziness in volunteers after 5 –minute exposure, severe eye and nasal Irritation, chest constriction

The time-weighted average concentration for a conventional 8-hour workday and a 40-hour workweek to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect is 100 ppm. The workplace threshold limit value for short term exposure (15 minutes with 60 minutes between successive exposures in this range) without suffering from irritation, chronic or irreversible tissue damage, or narcosis is 125 ppm.

Potential sequelae

If the patient survives the initial 48 hours after inhalation exposure, recovery is likely. After acute exposure, pulmonary function usually returns to normal in 7 to 14 days. Complete recovery is usual; however, symptoms and pulmonary deficits may persist. Pulmonary tissue destruction and scarring may lead to chronic dilation of the bronchi and increased susceptibility to infection. Damage to liver may occur in chronic exposure.

4. Actions

Decontamination

Patients exposed to ethylbenzene require decontamination.
Patients who are able and cooperative may assist with their own decontamination. If clothing is contaminated, remove and double-bag the clothing.

Assure that exposed or irritated eyes have been irrigated with plain water or saline for at least 20 minutes. If not, continue eye irrigation during other basic care.

Remove contact lenses if present and easily removable without additional trauma to the eye.

Assure that exposed skin and hair have been flushed with plain water for at least 15 minutes. If not, continue flushing during other basic care. Protect eyes during flushing of skin and hair.

Assure that following ingestion mouth was rinsed with plenty of water and afterwards charcoal as a slurry (240 ml water/30 g charcoal) has been administered. Emesis not recommended due to the potential for esophageal irritation and aspiration.

Initial treatment

Therapy will be empiric; there is no specific antidote to counteract the effects of ethylbenzene.

If inhalational exposure exceeds 100 ppm (for 15 minutes or more), if symptoms, e. g. eye irritation or pulmonary symptoms have developed, or if no exposure concentration can be estimated but exposure has possibly occurred:

- **Administration of oxygen**
- **Administration of 8 puffs of beclomethasone (800 µg beclomethasone dipropionate) from a metered dose inhaler.**

Patients with severe clinical respiratory symptoms (e.g. bronchospasms, stridor) should be treated as follows:
a) Nebulization of adrenaline (epinephrine): 2 mg adrenaline (2 ml) with 3 ml NaCl 0.9% and inhale through a nebulizer mask.

b) Administration of a ß2-selective adrenoceptor agonist, e.g., four strokes of terbutaline or salbutamol or fenoterol (one stroke usually contains 0.25 mg of terbutaline sulfate; or 0.1 mg of salbutamol; or 0.2 mg of fenoterol); this may be repeated once after 10 minutes.
Alternatively, 2.5 mg salbutamol and 0.5 mg atrovent may be administered by nebulizer mask.
If inhalation is not possible, administration of terbutaline sulfate (0.25 mg to 0.5 mg) subcutaneously or salbutamol (0.2 mg to 0.4 mg over 15 minutes) intravenously.

c) Intravenous administration of 250 mg methylprednisolone (or equivalent steroid dose).

Intubation of the trachea or an alternative airway management should be considered in cases of respiratory compromise. When the patient's condition precludes this, consider cricothyrotomy if equipped and trained to do so.

Note: Efficacy of corticosteroid administration has not yet been proven in controlled clinical studies.
If ethylbenzene gas or liquid ethylbenzene has been in contact with the skin, irritations may result; treat as thermal burns.
After eye exposure, irritation may result; treat as thermal burns. Immediately consult an ophthalmologist.

Laboratory tests

The diagnosis of acute ethylbenzene toxicity is primarily a clinical one, based on the irritation and CNS effects together with known or strongly suspected ethylbenzene exposure. The sum of urinary mandelic acid and phenylglyoxylic acid excretion indicates exposure (biological exposure index: 0.7 g mandelic and phenylglyoxylic acids / g creatinine in the urine).

Further evaluation and treatment

Standard exposure history, physical examination, and vital signs, and spirometry should be obtained. Routine laboratory studies should include a complete blood count, blood glucose and electrolyte determinations.

Prophylactic antibiotics are not routinely recommended but may be used based on clinical signs of pneumonia.

Patient release/ follow-up instructions

Asymptomatic patients with an exposure concentration of **less than 100 ppm** (and less than 15 minutes) or minor direct contact to liquid **as well as patients who have a normal clinical examination and no signs or symptoms of toxicity may be discharged after an appropriate observation period in the following circumstances:**

a) The evaluating physician is experienced in the evaluation of individuals with ethylbenzene exposure.
b) Information and recommendations for patients with follow-up instructions are provided verbally and in writing. Patients are advised to seek medical care promptly if symptoms develop or recur.
c) The physician is comfortable that the patient understands the health effects of ethylbenzene.
d) Site medical is notified, so that the patient may be contacted at regular intervals in the 24-hour period following release from the emergency department
e) Drinking of alcoholic beverages should be forbidden for at least 72 hours.
f) Heavy physical work should be precluded for 24 hours.
g) Exposure to cigarette smoke should be avoided for 72 hours; the smoke may worsen the condition of the lungs.

Patients who have serious skin or eye injuries should be reexamined in 24 hours.

In this document BASF has made a diligent effort to ensure the accuracy and currency of the information presented but makes no claim that the document comprehensively addresses all possible situations related to this topic. This document is intended as an additional resource for doctors at hospitals/emergency departments in assessing the condition and managing the treatment of patients exposed to ethylbenzene. It is not, however, a substitute for the professional judgement of a doctor and must be interpreted in the light of specific information regarding the patient available to such a doctor and in conjunction with other sources of authority.

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