

Essential Information

WAC 296-848-60010

Health information about inorganic arsenic

- Make this section readily available to employees as required in Training, WAC 296-848-30005.
- Provide this section to the licensed health care professional (LHCP) as required in **Step 4** of the medical evaluation process found in Medical evaluations, WAC 296-848-30030.

Table 5 General Health Information about Inorganic Arsenic
What is inorganic arsenic?
<p>In this chapter, “inorganic arsenic” means</p> <ul style="list-style-type: none"> – The element arsenic – Arsenic containing compounds that don’t contain the element carbon – Copper aceto-arsenite <p>Arsine is a gaseous inorganic arsenic compound not addressed by requirements in this chapter. It’s addressed in a separate chapter, Airborne contaminants, chapter 296-841 WAC.</p>
How does inorganic arsenic get into my body?
<p>Inorganic arsenic enters your body when you:</p> <ul style="list-style-type: none"> – Breathe in (inhale) airborne particles such as dusts, fume, sprays, or other aerosols that contain inorganic arsenic. You will also inhale inorganic arsenic particles when you smoke tobacco products that have become contaminated from contact with inorganic arsenic at work. Some compounds including arsenic trichloride, can be inhaled as a vapor – Swallow (ingest) food, drink, cosmetics such as lip balm, sweat and other substances that become contaminated from contact with inorganic arsenic at work. <p>Inorganic arsenic particles brought home on your clothes, shoes, or body can be inhaled or ingested by household members.</p> <p>Some inorganic arsenic compounds enter your body when eye or skin contact occurs. Arsenic trichloride is one example of a compound that is readily absorbed through the eyes and skin.</p>
What happens after inorganic arsenic enters my body?
<p>Once inorganic arsenic enters your body, some of it is changed into a less harmful organic form by the liver. Both the organic and inorganic forms leave your body in urine.</p> <p>Most of the arsenic will be gone within several days, although some will remain in your body for several months and even longer.</p>
Why is medical monitoring necessary?
<p>Although exposure to inorganic arsenic is associated with various health effects, the most serious health effects are lungs and skin cancer. The medical monitoring requirements in this chapter are established to minimize your risk from these diseases.</p> <p>To learn more about the medical monitoring process, see Medical evaluations, WAC 296-848-30030.</p>

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Essential Information

WAC 296-848-60010 (continued)

Table 5 (Continued)
General Health Information about Inorganic Arsenic

What health effects and symptoms are linked with exposure to inorganic arsenic?

Exposure to inorganic arsenic is associated with various health effects ranging from **temporary local** effects such as skin irritation to **lasting systematic** effects due to gradual (chronic) or sudden (acute) poisoning. Such effects should not occur if the requirements in this chapter are followed.

Skin Health Effects:

Arsenic trioxide, arsenic trichloride, and other trivalent compounds can cause skin irritation from direct contact.

– The following moist mucous membranes are most sensitive to irritation:

- Eye and inner eyelid (conjunctiva)
- Linings inside the nose, mouth, and respiratory system.

– Other sites most vulnerable irritation also include:

- Eyelids
- Angles (the space between 2 planes) of the ears, nose, and mouth:
- Moist and macerated (softened by moisture) areas of skin
- Wrists
- Genitalia, if personal hygiene is poor.

Inorganic arsenic is also capable of causing keratoses (small corns or warts), especially on palms or soles.

Trivalent arsenic compounds are corrosive to skin:

- Brief contact will not cause irritation, but prolonged contact causes localized engorgement (hyperemia) which later forms vesicular (blister-like) or pustular (pimple-like) eruptions.
- Exposure can create perforations (holes) in the nasal septum (the tissue dividing the nasal cavity in half).

Arsenic trioxide and arsenic pentoxide exposure have been linked to skin sensitization (acquired sensitivity to allergy) and contact dermatitis (inflammation due to allergic or irritant reaction).

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Table 5 (Continued) General Health Information about Inorganic Arsenic
What health effects and symptoms are linked with exposure to inorganic arsenic? (continued)
<p><u>Acute Poisoning Effects:</u></p> <p>Acute poisoning is usually linked to ingestion, not inhalation, of inorganic arsenic. Cases of acute poisoning rarely occur in occupational settings and inhalation-related cases are exceedingly rare. When acute poisoning is due to ingestion, the following gastrointestinal symptoms develop within ½ to 4 hours:</p> <ul style="list-style-type: none">– Tightening (constriction) of the throat followed by difficulty or inability to swallow (dysphagia), pain in the region above the belly button (epigastric pain), vomiting, and watery diarrhea. Blood may appear in vomit and stools;– Shock may develop due to severe fluid loss when the amount of inorganic arsenic swallowed is sufficiently high. Death can occur in 24 hours. <p>When acute poisoning is due to inhalation:</p> <ul style="list-style-type: none">– The following symptoms develop first:<ul style="list-style-type: none">• Cough• Chest pain• Shortness of breath (dyspnea)• Giddiness• Headache• Extreme general weakness.– Gastrointestinal symptoms will follow.

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Arsenic

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Essential Information

WAC 296-848-60010 (continued)

Table 5 (Continued)
General Health Information about Inorganic Arsenic

What health effects and symptoms are linked with exposure to inorganic arsenic? (continued)

Chronic Poisoning Effects:

Cases of chronic poisoning caused by ingestion are also rare. Symptoms are:

- Weight loss
- Nausea and diarrhea alternating with constipation
- Skin pigmentation and eruptions
- Hair loss
- Numbness in hands and feet “pins and needles” sensation, muscle weakness, and other symptoms resulting from peripheral neuritis
- Horizontal white lines (striations) on fingernails and toenails.

Inhalation of inorganic arsenic is the most common cause of chronic poisoning in occupational settings. Symptoms associated with this condition are divided into 3 phases:

- 1st phase, earliest symptoms:
 - Weakness
 - Loss of appetite
 - Some nausea
 - Occasional vomiting
 - Sense of heaviness in the stomach
 - Some diarrhea
- 2nd phase symptoms:
 - Inflammation of the eyes and inner eyelid (conjunctivitis)
 - Inflammation, accompanied by an abundant discharge from mucous membranes (a catarrhal state) of the nose, larynx, and respiratory passage
 - Symptoms associated with the common cold (Coryza), hoarseness, and mild tracheobronchitis may occur
 - Skin lesions are common (eczematoid and allergic in type). Perforations (holes) in the nasal septum (the tissue dividing the nasal cavity in half) are the most typical lesions of the upper respiratory tract.
- 3rd phase symptoms(related to peripheral neuritis):
 - Numbness in the hands and feet “pins and needles” sensation, muscle weakness
 - In severe cases, motor paralyzes occur: Initially affecting the toe extensors and the peronei (outer portion of the lower leg).
 - “Wrist drop” or “foot drop” (resulting from paralysis of flexor muscles of feet and hands) **only occurs in the most severe cases.**



Essential Information

WAC 296-848-60020

Medical guidelines

- Make this section readily available to employees as required in Training, WAC 296-848-30005.
- Provide this section to the licensed health care professional (LHCP) as required in **Step 4** of the medical evaluation process found in Medical evaluations, WAC 296-848-30030.

Table 6 Medical Guidelines for Evaluating Employees with Exposure
Part I: DOSH's Requirements
<p>In addition to requiring employers to train employees and protect them from inorganic arsenic exposures, this chapter (the Arsenic rule) requires employers to monitor their employee's health with assistance from licensed health care professionals (LHCPs).</p> <ul style="list-style-type: none">• For employees who will use respirators, the LHCP will also need to provide the employer with a written medical opinion clearing the employee for workplace respirator use. <p>These guidelines were designed to support an informed partnership between the LHCP and the employer when monitoring the health of employees exposed to inorganic arsenic.</p> <p>The employer initiates this partnership by providing the LHCP with a copy of the chapter and other supporting information about the employee and job conditions. The LHCP can then become familiar with the medical monitoring requirements found in WAC 296-848-30030 and 296-848-30080, which address:</p> <ul style="list-style-type: none">• Frequency and content for routine (initial and periodic) medical examinations and consultations;• Emergency and other unplanned medical follow-up• Medical opinions• Medical records retention and content.

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Essential Information

WAC 296-848-60020 (continued)

Table 6 (Continued) Medical Guidelines for Evaluating Employees with Exposure	
Part 2: Inorganic Arsenic Toxicology:	
<p>Health information about inorganic arsenic, WAC 296-848-50020 provides basic information about the health effects and symptoms associated with inorganic arsenic exposure. In addition, consider the following information:</p>	
<p>Acute Poisoning</p> <p>Exfoliative dermatitis and peripheral neuritis may develop in patients who survive health effects due to acute poisoning (by ingestion). Acute toxic symptoms of trivalent arsenical poisoning are caused by severe inflammation of the mucous membranes and greatly increased permeability of the blood capillaries.</p>	
<p>Acute and Chronic Poisoning</p> <p>In cases of acute and chronic poisoning, toxic effects to the myocardium (the middle layer of the heart) reported on EKG changes are now largely discounted and are attributed to electrolyte disturbances concomitant with arsenicalism. Arsenic has a depressant effect upon bone marrow, with disturbances of both red blood cell production (erythropoiesis) and myelopoiesis.</p>	
<p>Chronic Poisoning</p> <p>Cases of chronic poisoning caused by ingestion are generally linked to patients taking prescribed medications. However, sputum from inhaled inorganic arsenic can be swallowed in addition to other ingested inorganic arsenic due to hand-to-mouth transfer. Chronic hepatitis and cirrhosis have been described. Liver damage is still debated and as yet the question is unanswered.</p>	
<p>Polyneuritis may be the prominent feature, but more frequently there are numbness and parasthenias of "glove and stocking" distribution. Horizontal white lines (striations) on the fingernails and toenails are commonly seen and are considered a diagnostic accompaniment of arsenical polyneuritis.</p>	
<p>References:</p> <ul style="list-style-type: none">• Other sources for toxicology information include:<ul style="list-style-type: none">– ToxFAQs™ and the Toxicological Profile for Arsenic. Both of these free documents are available from the Agency for Toxic Substances and Disease Registry (ATSDR) and can be obtained by:<ul style="list-style-type: none">▪ Visiting http://www.atsdr.cdc.gov/toxprofilesor▪ Calling 1-888-422-8737– A variety of technical resources on arsenic, available from the National Institute for Occupational Safety and Health (NIOSH) by visiting http://www.cdc.niosh/topics/chemicals/html	

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Table 6 (Continued) Medical Guidelines for Evaluating Employees with Exposure
Part 3. Clinical Evaluations of Employees Exposed to Inorganic Arsenic
IMPORTANT: <ul style="list-style-type: none">• When an employee will use a respirator during work, the LHCP will need to determine whether the employee can safely wear a respirator and what limitations, in any, apply.
<u>Guidance for Physical Examinations</u> <p>In addition to its immediate diagnostic usefulness, a patient's initial examination will provide a baseline for comparing future test results.</p> <p>This chapter establishes the minimum content for medical examinations. Additional tests such as lateral and oblique X rays or pulmonary function test may be useful.</p> <p>You should also include palpation of superficial lymph nodes and a complete blood count when employees are exposed to any of the following compounds:</p> <ul style="list-style-type: none">– Copper aceto-arsenite– Potassium arsenite– Sodium arsenite– Other arsenicals associated with lymphatic cancer. <p>Arsenic trioxide and other inorganic arsenical dusts do not give rise to radiological evidence or pneumoconiosis.</p>



Notes

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