What is acetic acid?

Acetic acid is also known as ethanoic acid, ethylic acid, vinegar acid, and methane carboxylic acid; it has the chemical formula of CH_3COOH. Acetic acid is a byproduct of fermentation, and gives vinegar its characteristic odor. Vinegar is about 4-6% acetic acid in water. More concentrated solutions can be found in laboratory use, and pure acetic acid containing only traces of water is known as glacial acetic acid.

Acetic acid is the 33rd highest volume chemical produced in the United States. Acetic acid is used in the manufacture of acetic anhydride, cellulose acetate, vinyl acetate monomer, acetic esters, chloracetic acid, plastics, dyes, insecticides, photographic chemicals, and rubber. Other commercial uses include the manufacture of vitamins, antibiotics, hormones, and organic chemicals, and as a food additive. Typical concentrations of acetic acid occurring naturally in foods are 700 to 1,200 milligrams/kilogram (mg/kg) in wines, up to 860 mg/kg in aged cheeses, and 2.8 mg/kg in fresh orange juice.

What are the health effects of acetic acid exposure?

Acetic acid is a strong eye, skin, and mucous membrane irritant. Prolonged skin contact with glacial acetic acid may result in tissue destruction. Inhalation exposure (8 hours) to acetic acid vapors at 10 parts per million (ppm) could produce some irritation of eyes, nose, and throat; at 100 ppm marked lung irritation and possible damage to lungs, eyes, and skin might result. Immediately dangerous to life or health (IDLH) vapor concentrations of 1,000 ppm cause marked irritation of eyes, nose and upper respiratory tract and cannot be tolerated. These predictions were based on animal experiments and industrial exposure. Skin sensitization to acetic acid is rare, but has occurred.

It has been reported that in 12 workers exposed for two or more years to an average acetic acid airborne concentration of 51 ppm, there were symptoms of conjunctival irritation, upper respiratory tract irritation, and hyperkeratotic dermatitis. Exposure to 50 ppm or more is intolerable to most persons and results in intensive tearing and irritation of the eyes, nose, and throat, with pharyngeal edema and chronic bronchitis. Unacclimatized humans experience extreme eye and nasal irritation at concentrations in excess of 25 ppm, and conjunctivitis from concentrations below 10 ppm has been reported. In a study of 5 workers exposed for 7 to 12 years to concentrations of 80 to 200 ppm at peaks, the principal findings were blackening and hyperkeratosis of the skin of the hands, conjunctivitis (but no corneal damage), bronchitis and pharyngitis, and erosion of the exposed teeth (incisors and canines).

Can acetic acid cause cancer?

It is unknown whether acetic acid could cause cancer in humans, but studies in animals and cell lines show no link to cancer or birth defects.

Are there any standards for exposure?

The Occupational Safety and Health Administration (OSHA) standard for airborne acetic acid as an eight-hour, time-weighted average (TWA) is 10 ppm. The American Conference of Governmental Industrial Hygienists (ACGIH) has adopted a threshold limit value (TLV) of 10 ppm. The United Sates

Food and Drug Administration (FDA) has affirmed that acetic acid is generally recognized as safe as a multipurpose food additive, as a substance migrating to food from cotton and cotton fabrics used in dry-food packaging, as a substance migrating to food from paper and paperboard products, and as a general purpose food additive for animal feed.

How can I learn more about acetic acid?

- If you have concerns about acetic acid, contact your healthcare provider.
- Call your local health department. A directory of local health departments is located at https://www.vdh.virginia.gov/local-health-districts/.
- Contact the Virginia Department of Health at (804) 864-8182 or at toxicology@vdh.virginia.gov.

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