Chemical Sampling Information: Ozone

Safety and Health Topics
Chemical Sampling Information: Ozone
- General Description
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General Description

Synonyms: Triatomic oxygen

OSHA IMIS Code Number:1980

Chemical Abstracts Service (CAS) Registry Number:10028-15-6

NIOSH, Registry of Toxic Effects (RTECS) Identification Number:RS8225000

NIOSH Pocket Guide to Chemical Hazards, Ozone:chemical description, physical properties, potentially hazardous incompatibilities, and more

Exposure Limits

OSHA Permissible Exposure Limit (PEL) for General Industry:29 CFR 1910.1000 Z-1 Table-- 0.1 ppm, 0.2 mg/m^{3}TWA

OSHA Permissible Exposure Limit (PEL) for Construction Industry:29 CFR 1926.55 Appendix A-- 0.1 ppm, 0.2 mg/m^{3}TWA

OSHA Permissible Exposure Limit (PEL) for Maritime:29 CFR 1915.1000 Table Z-Shipyards-- 0.1 ppm, 0.2 mg/m^{3}TWA

American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV): Heavy Work - 0.05 ppm TWA; Moderate Work - 0.08 ppm TWA; Light Work - 0.10 ppm TWA; Heavy, Moderate, or light workloads (≤ 2 hrs) - 0.20 TWA; Appendix A4 - Not Classifiable as a Human Carcinogen

National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limit (REL):0.1 ppm, 0.2 mg/m^{3}Ceiling

Health Factors

NIOSH Immediately Dangerous To Life or Health Concentration (IDLH):5 ppm

Potential symptoms: Eye, mucous membrane irritation; headache, fatigue, dizziness, drowsiness; anorexia, nausea, vomiting; cough, sore throat; shortness of breath, pulmonary edema; chronic respiratory disease; conjunctivitis; eye, skin burns; frostbite (on contact with liquid); rapid heart rate (tachycardia), low blood pressure (hypotension).

Health Effects: Irritation-Eyes, Nose, Throat, Skin---Marked (HE14); Lung edema (HE11), Cumulative lung damage (HE10), Respiratory sensitization (HE9).

Affected organs: Eyes, respiratory system

Notes:1) Generally recognized as safe by the Food and Drug Administration for use as an antimicrobial agent in bottled water at a maximum residual concentration of 0.4 mg/liter (21 CFR 184.1563); use in treatment, storage, and processing of other foods is also regulated by 21 CFR 173.368. 2) Ozone can increase sensitivity to bronchoconstrictors and allergens, and may facilitate the development of asthma. 3) One proposed mechanism for ozone-induced lung cell damage is the stimulation of lipid peroxidation, which produces aldehydes like 4-hydroxynonenal that can form adducts with cysteine, lysine, and histidine in lung proteins.

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Literature Basis:

- NIOSH Pocket Guide to Chemical Hazards: Ozone.
- International Chemical Safety Cards (WHO/IPCS/ILO): Ozone.
- Anderson, W., Prescott, G.J., Packham, S., Mullins, J., Brookes, M. and Seaton, A.: Asthma admissions and thunderstorms: a study of pollen, fungal spores, rainfall, and ozone. *QJM* **94**(8): 429-433, 2001.
- Hamilton, R.F., Jr., Li, L., Eschenbacher, W.L., Szweda, L. and Holian, A.: Potential involvement of 4-hydroxynonenal in the response of human lung cells to ozone. *Am. J. Physiol.* **274**(1 Pt. 1): L8-16, 1998.
- Olin, A.C., Andersson, E., Andersson, M., Granung, G., Hagberg, S. and Toren, K.: Prevalence of asthma and exhaled nitric oxide are increased in bleachery workers exposed to ozone. *Eur. Respir. J.* **23**(1): 87-92, 2004.
- Pohanish, R.P. (editor): Ozone. In, *Sittig's Handbook of Toxic and Hazardous Chemicals and Carcinogens, Fourth Ed.*, Vol. 2. Norwich, NY: Noyes Publications, William Andrew Publishing, 2002, pp. 1774-1776.
- Williams, L.K., Langley, R. and Howell, R.J.: Ozone. The good, the bad, and the ugly. *N C Med. J.* **61**(2): 84-89, 2000.

Monitoring Methods used by OSHA

Laboratory Sampling/Analytical Method:

- **sampling media:** Two Impregnated Glass Fiber Filters (37mm polystyrene cassette) coated with a solution containing $NaNO_2$, K_2CO_3 and Glycerol in water
  maximum volume: 22.5 Liters **maximum flow rate:** 1.5 L/min
  maximum time: 15 minutes
  maximum volume: 90 Liters **maximum flow rate:** 0.5 L/min
  maximum time: 180 Minutes
  maximum volume: 120 Liters **maximum flow rate:** 0.25 L/min
  maximum time: 480 Minutes
  current analytical method: Ion Chromatography; IC
  method reference: OSHA Analytical Method (OSHA 214)
  method classification: Fully Validated
  notes: 1) If the expected ozone concentration exceeds 0.2 ppm, the recommended maximum sampling rate is 0.25 L/min and the recommended maximum time is 180 min. 2) OSHA personnel can request the sampling medium from SLTC. 3) The sampling medium must be used within 30 days of preparation. 4) Sulfur dioxide (SO_2) is a sampling interference, and oxidizer tubes must be used if SO_2 is suspected to be present. 5) The sampling medium is shipped from SLTC in cassettes and each cassette is individually sealed in an aluminumized plastic bag to prevent contamination. Each exposed sampler must be returned for analysis also sealed in an aluminumized plastic bag.

Wipe sampling: No

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

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