

Industrial Hygiene Sampling



INSafe – Indiana Department of Labor

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Air Contaminants



- **Particulates**
 - Dust - 0.1 - 25 micrometers
 - Fume - < 1 micrometer
 - Mist - suspended liquid droplet
 - Fibers - length > or = 2 X diameter

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Air Contaminants

- **Gases and Vapors**

- Gases - formless fluids which assume container shape
- Vapors - Volatile form of a substance
 - ✦ Often organic, i.e. carbon

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Units of concentration

- ppm - parts contaminant / million parts air (gases and vapors)
- mg/m³ - milligrams per cubic meter (particulates)
- f/cc - fibers per cubic centimeter
- % LEL - % lower explosive limit

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Health and Safety Standards



- OSHA - Permissible Exposure Limit (PEL)
- American Conference of Governmental Hygienists - Threshold Limit Value (TLV)
- National Institute for Occupational Safety and Health - Recommended Exposure Limit (REL)

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PEL Exposure Limits



- **Table Z-1**
 - TWA - time weighted average (8 hours)
 - Ceiling - at no time exceed (15 min. sample)
 - Skin designation - protection at limits
- **Table Z-2**
 - TWA
 - Acceptable Ceiling Concentration
 - Maximum peak above the ceiling

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TLV Exposure Limits

- TWA
- STEL - short term exposure limit
- Ceiling - don't exceed at all
- Skin notation

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Types of Instruments

- Pumps - send samples to lab
- Direct reading - electronic
 - Instantaneous
 - Dosimeter
- Detector tube - read stain from chemical reaction
 - Cylinder or bellows pump
 - Passive tube - usually dosimeter

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Pump Sampling

- Wide variety of media for many contaminants
- Very accurate - 5 % typical
- Must wait for results

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Direct Reading Instruments

- Instant results - printout or display
- Can be expensive
- Must replace sensors
- Can be delicate

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Detector Tubes



- Instant results
- Pumps are inexpensive
- Usually not the best accuracy - 25 to 35 % typical
- Tube usually specific for contaminant
- Tubes degenerate over time

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Miscellaneous to Observe



- Calibrate before and after
- Intrinsic safety
- Suitability for method, accuracy, conditions, etc.
- Often less expensive to rent

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Sampling Guidelines

- **Manufacturer**
- **Health standard may specify**
- www.osha.gov
- www.cdc.gov
- acgih_pubs@pol.com

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