

Occupational Uses

- Laboratory Chemical
- Synthesis of other compounds
- (Sigma-Aldrich, 2024)
- Solvents—Lacquers, paints, inks
 - “Activator or hardener” in paints
- Nail polish/nail polish remover
- Synthetic Flavoring: candy, jams, wines
- Glue
- Perfume
- (NJ DHSS, 2002)

Occupational Exposure

- Exposure may occur through:
 - Inhalation of vapors that have volatilized
 - Ingestion of liquid due to contamination or accidents
 - Dermal contact
- Exposure is most common in the following occupations
 - Nail techs
 - Furniture manufacturing
 - Printers
 - Painters
 - Anyone working with solvents
- (NCBI, 2014)

Toxicological Data

- Primary route of exposure: Inhalation
- Excretion is primarily through exhaled air and urine
- (Estevan & Vilanova, 2024)
- LD₅₀ in rats – 5,620 mg/kg (no human LD₅₀ reported)
- (Sigma-Aldrich, 2024)
- Acute exposure
 - Headache
 - Drowsiness
 - Dizziness
 - Vomiting
 - Narcosis
 - Anemia
 - Central Nervous System depression
 - (ILO, 2014)
- Irritates Mucosal surfaces
 - Serious eye irritant—eyes may appear red
 - Respiratory tract
 - Sore throat, cough, etc.
 - (ILO, 2014)
- Chronic Exposure:
 - Liver and kidney issues
 - Ethyl Acetate congests in these organs
 - Eye irritation and clouding
 - Dry and cracked skin (loss of fat)
 - (TURI, 2016)

Epidemiological Studies

- Postmortem forensic study sampled 1,954 different body’s tissues.
- 17 had detectable levels of ethyl acetate, 897 had detectable levels of ethanol
- Ethanol is a metabolite of ethyl acetate but may also be present from other sources (alcohol consumption).
- Ethyl Acetate found in 2% of the samples ethanol was found in with a range of 0.28 - 0.79 mg/dL.
- Ethyl Acetate detected only in samples that had ethanol concentrations of 0.06 to 6.24 g/L; not detected in any of the samples that had ethanol concentrations lower than 0.05 g/L.
- (Boumba et al., 2022)
- 1982 Workplace study after workers complained of mucous membrane irritation, respiratory symptoms and headache.
- At first thought to be a result of acute ethyl acetate exposure.
- Monitoring showed a general worker exposure of 2-14 ppm, well below PEL.
- It was determined that symptoms must be from another source.
- (Gorman & Schloemer, 1982)

Sampling Methods

- National Institute for Occupational Safety and Health (NIOSH) Sampling Method 1457
 - Solid sorbent tube with coconut shell charcoal (100 mg/50 mg)
 - Air flow rate: 0.01 to 0.2 L/minute
 - Volume: Min: 0.1 L at 1400 mg/m³ Max: 10 L
 - If shipped, sample must be refrigerated
 - Maintained at a temperature of 5°C, is stable for 6 days
 - (NIOSH, 1994)
- Occupational Safety and Health Administration (OSHA) Method 5000
 - Solid sorbent tube with coconut shell charcoal (100 mg/50 mg)
 - Air flow rate: 0.05 L/min
 - Time: 120 minute
 - (OSHA, 2023)

Analytical Methods

- Same Analytical Methods for NIOSH and OSHA
- Gas Chromatography (GC) – Flame Ionization Detection (FID)
- (NIOSH, 1994; OSHA, 2023)

Occupational Exposure Limits (OELs)

- OSHA PEL-TWA 1440 mg/m³ (400 ppm)
- NIOSH REL-TWA 1440 mg/m³ (400 ppm)
- ACGIH TLV-TWA 1440 mg/m³ (400 ppm)
- IDLH concentration 2000 ppm
- (OSHA, 2023)

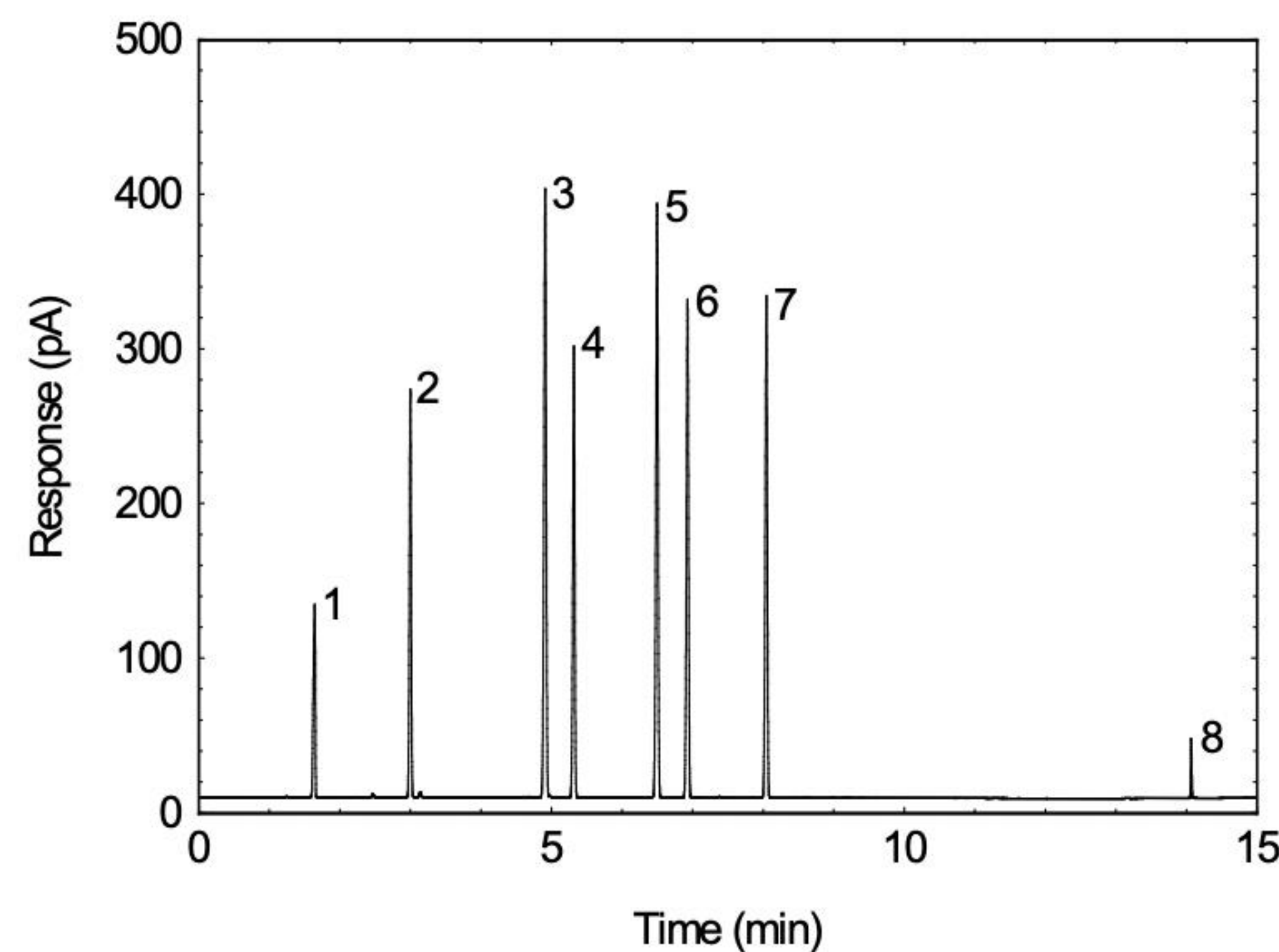


Figure 2. Gas chromatograph for acetate compounds, label (2) indicates peak for ethyl acetate; <https://www.osha.gov/sites/default/files/methods/5000.pdf>



Figure 1. Ethyl Acetate Paint with brush, a common use of the compound and route of exposure; <https://www.grahamchemical.com/products/ethyl-acetate/>

Case Study

- In 1931, a 39-year-old man was found face down dead in a tank.
- He had been painting the inside with a paint containing ethyl acetate without gloves, protective clothing, or a respirator.
- Post-mortem studies found through headspace gas chromatography mass spectrometry (HS-GC/MS) that his body held ethyl acetate, the concentrations were found with HS-GC/FID.
- Note that ethyl acetate is hydrolyzed to ethanol and acetic acid in the blood.

	Ethyl Acetate	Ethanol
Brain	0.210 g/kg	2.08 g/kg
Blood	0.038 g/L	2.02 g/L
Lungs	0.035 g/kg	2.99 g/kg
Kidney	0.015 g/kg	2.39 g/kg
Liver	< 0.028 g/kg	1.80 g/kg
- Anoxia brought on by acute intoxication of ethyl acetate was deemed the caused of death (he had not consumed alcohol).
- (Coopman et al., 2005).

Control Measures

- Engineering:
 - Substitution (when and where possible)
 - Enclosure or Isolation of operations
 - Local exhaust ventilation
 - Administrative
 - Limited entry to confined spaces with ethyl acetate
 - Monitoring for explosive concentrations of ethyl acetate
 - Employee training—thorough washing and first aid procedures, hazard information
 - Personal Protective Equipment (PPE)
 - Respirators
 - Protective clothing
 - Solvent resistant; gloves
 - American Conference of Governmental Industrial Hygienists (ACGIH) recommends butyl rubber
 - Eye protection
 - Splash resistant; face shield; no contacts
- (NJ DHSS, 2002)

References

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