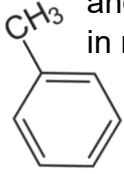
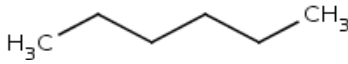


'ORGANIC' (i.e. carbon-based) SOLVENTS

VOCs have Boiling Points at 50° to 250° C and many are industrial solvents, often in mixtures as fuels, degreasers, etc.



- Look at their MSDS data



- vapor pressure (volatility) and Henry's law
- lipid solubility (pass the blood-brain barrier)
- concentration in air (compare with TLVs)

SOURCE(S) AND DURATION OF EXPOSURES:

ROUTES OF ABSORPTION, E.G., LUNG, SKIN, GI:

FACTORS IN ORGAN-SPECIFIC ABSORPTION:

- minute ventilation
- blood/air partition coefficient of solvent
- exhalation of some unchanged VOCs

TARGET ORGAN TOXICITY:

Cardiovascular disease, e.g., CS₂

Reproductive/Developmental Effects

e.g., glycol ethers, chloroform, DCBM, 'fetal alcohol/solvent syndromes' e.g., EtOH, CS₂

Carcinogenesis

e.g., benzene → aplastic anemia, myelodysplasias, leukemia; TCE → liver & kidney CA; VOCs → breast CA

ELIMINATION:

Hepatic Biotransformation

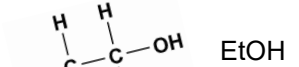
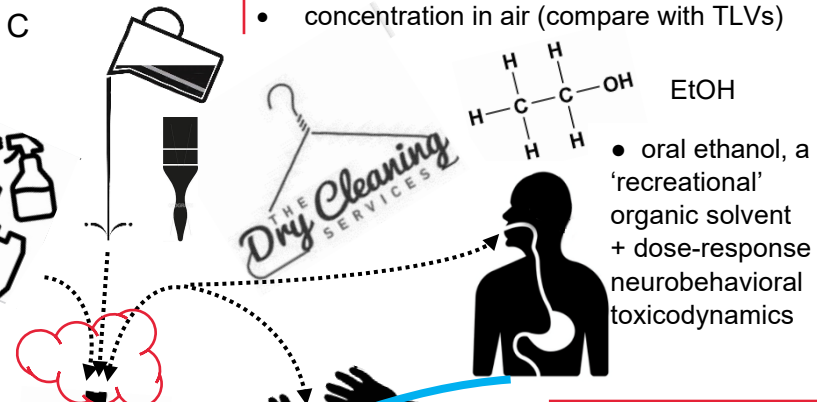
- Genetic polymorphism
- May create toxicants, e.g., styrene → styrene-7,8-oxide
- Hepatocellular injury, especially lobular zone 3
- Toxicant Associated SteatoHepatitis (TASH)
- Serum enzyme markers
- Confounding non-occupational toxins, e.g., meds, EtOH

Renal Excretion

- Some reported solvent glomerulonephritides
- Acute tubular necrosis
- Subclinical chronic effects on GFR, e.g., BTEX

Biological Monitoring, usually from urine

- May use metabolites, e.g., hippuric acid from toluene
- Compare with ACGIH Biological Exposure Indices (BEIs)



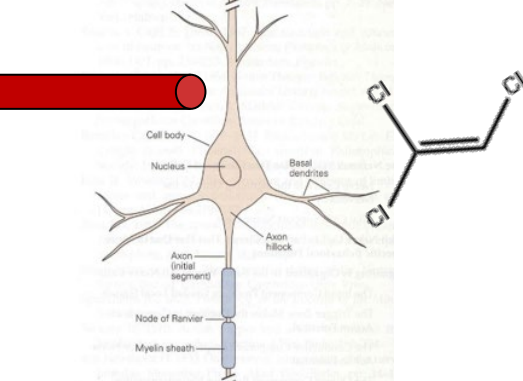
- oral ethanol, a 'recreational' organic solvent + dose-response neurobehavioral toxicodynamics

- molecular weight of solvent
- skin surface area exposed
- permeability of solvent
- rate of diffusion (Fick's law)
- stratum corneum integrity
- occlusion

Dermatitis,
acute and
chronic

CNS Effects

- Neurobehavioral
- Neurocognitive
- Neuroaffective
- e.g., VOCs, CS₂, ethanol
- WHO categories of CSE
- Parkinsonism, e.g., TCE
- Tremors, e.g., PERC
- Ataxia, e.g., toluene
- MS?



PNS Effects

- Axonopathies / peripheral neuropathies
- e.g., n-hexane, MnB ketone, ethanol
- Trigeminal neuralgia, e.g., TCE

Infographic by R. Douglas Hamm