Chemical Classes in Policy-Making

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TURI
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UMASS LOWELL

Toxics Use Reduction

If you don't use toxic substances to begin with, there is no need to manage their impact on health and the environment

- Inherently safer throughout life cycle
- Protects occupational and public health
- Protects the environment
- Spurs innovation of safer alternatives

Massachusetts Toxics Use Reduction Act

- MA manufacturers and processors
- Sustain and promote the competitive position of Massachusetts industry
- TUR: Promote reduction in the use of toxic and hazardous substances
- Require businesses to analyze their use of chemicals, to look for opportunities to reduce toxics use and waste.
- Right to Know: Publicly report their toxic chemical use

Chemical Classes under TURA

Chemical categories
avoid regrettable substitutions
with similar, unregulated chemicals
and
Provide guidance to decision-makers
as they look for safer alternatives

When to use classes/categories?

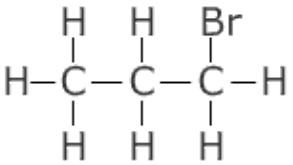
- Similar chemical structures, or substance or functional group of concern
  - E.g., metal compounds, diisocyanates
- Common health/envir effects across class
  - Dioxins
- Interchangeable for given application
  - E.g., glycol ethers
- Commercial mixtures common
  - phthalate esters
- Uncertainty about specific substances in formulation
  - Polycyclic aromatic compounds

Challenges to classes/categories

- Variability across class
- Compliance
- Less information under Right to Know
- Boundaries of category
  - Precursors, intermediates, breakdown products

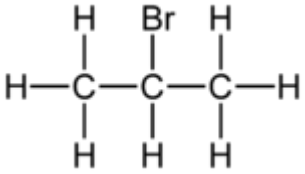
Chemical Classes under TURA

- Solvents and halogenated compounds
  - C1-C4 halogenated hydrocarbons/halocarbons not otherwise listed [C1-C4 NOL]
    - Evidence of similar human health (neurotoxicity, reproductive and developmental, liver, cardiovascular, kidney effects, etc) and environmental (persistence, ozone depletion, GWP, aquatic toxicity) effects seen across category



1-bromopropane

Listed on TURA

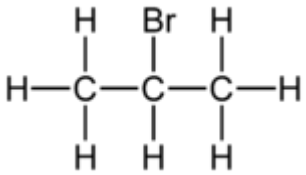


2-bromopropane

Added as part of C1-C4 category

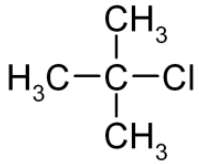
C1-C4 Halogenated Hydrocarbons/Halocarbons Not Otherwise Listed [C1-C4 NOL]

- Defined by chemical structure
  - Only Carbon, one or more halogens (Cl, Br, F, I), and optionally Hydrogen
  - Only those Not Otherwise Listed
- Example substances:



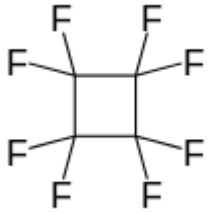
2-bromopropane

(2-propyl bromide)



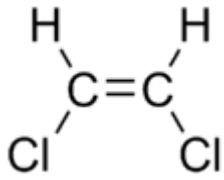
2-chloro-2-methyl propane

(tert butyl chloride)



Octafluorocyclobutane

(Freon C318)



cis-1,2-dichloroethylene

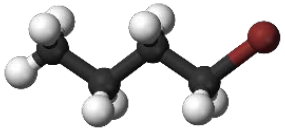
(cis-DCE)

C1-C4 halogenated hydrocarbons/halocarbons not otherwise listed

Solvent - cleaning, degreasing, adhesives, extraction

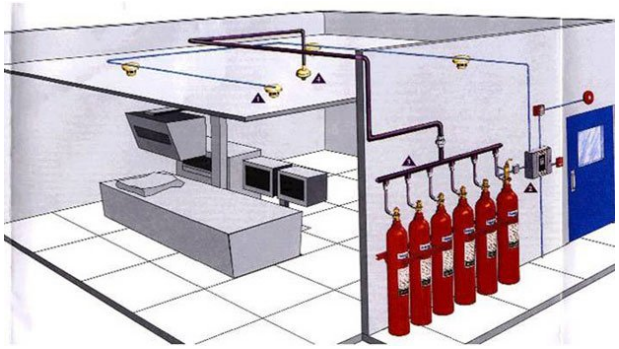
Credit: Wikimedia Commons

propellant



$2\ Li + C_4H_9X \rightarrow C_4H_9Li + LiX$
where X = Cl, Br

Feedstock/intermediate



Credit: Fire Safety Nation

Fire suppressant

Credit: Wikimedia Commons

Refrigerant

Credit: Spray Polyurethane Foam Alliance

Blowing agent

PFAS (Per- and Polyfluoroalkyl substances) – *under evaluation*

- PFAS Class of compounds:
  - Numerous
  - Structure similarity: fluorinated alkyl chain
  - Similar set of terminal degradation products
  - Evidence of similar health and environmental effects, vary in potency
  - Interchangeability
  - Easily modified to introduce new substances
  - Analytically challenging
  - Regulating limits for each chemical challenging

PFAS (Per- and Polyfluoroalkyl substances) – *under evaluation*

- Does a category make sense for TURA?
- Would use the category to:
  - Evaluate use, function, 'necessariness,'
  - Identify process improvement opportunities
  - Identify and evaluate safer alternatives
  - Spur innovation, create awareness
  - Right-to-Know reporting on use and emissions
  - Focus program resources: technical assistance, grants, research, information

PFAS (Per- and Polyfluoroalkyl substances) – *under evaluation*

- TURA Science Advisory Board considering per- and polyfluoroalkyl substances
- To date, have recommended adding the following chemicals and their salts to the TURA list of toxic and hazardous substances:
  - PFOS, PFOA (C8)
  - PFHxS, PFHxA (C6)
  - PFBS, PFBA (C4)
  - PFNA (C9), PFHpA (C7)
  - Gen-X (fluoroether)
  - Phosphonic/phosphinic acids
- Studying precursors and breakdown/transformation pathway
- Preparing policy analysis

Thank-you

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