



# MA Flame Retardants Law, 2020

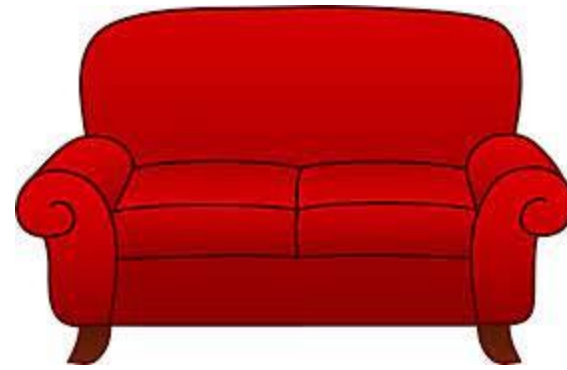
An Act to Protect Children, Families and Firefighters from Harmful Flame Retardants

Mass. Gen. Laws Ch 21A, Section 28



## MA Flame Retardants Law

- January 1, 2021 – Signed into law by Gov. Baker
- September 15, 2022 – Regulations proposed, open for comments (now closed)
- DEP currently working on response to comments



## MA Flame Retardants Law

Who:	Manufacturer, Retailer
Cannot:	Sell, manufacture for sale, offer for sale, distribute in commerce, import into Mass.
What:	Product that contains any of the named 11 flame retardants or chemical analogues, the total weight of which is >1000ppm for any component part
In:	Bedding, carpeting, children's products, residential upholstered furniture or window treatments

## Differences between TURA and FR law

Provision	MA TURA	MA FR Law
Who does it affect?	Users (manufacturers and distributors) in certain SIC codes, >10 workers	Retailers, importers, and users (manufacturers, distributors)
Which chemicals?	List of over 1500 chemicals, above thresholds	11 chemicals and <b>chemical analogues</b> of the 11, above 1000 ppm for any component
What do they have to do?	Report and plan	<b>This is a ban.</b>
What end products?	All	Bedding, carpeting, children's products, residential upholstered furniture or window treatments

## The 11 chemicals in the MA FR law:

- Tris(1,3-dichloro-2-propyl)phosphate (TDCPP), 13674-87-8
- Tris(2-chloroethyl)phosphate (TCEP), 115-96-8
- Tris (1-chloro-2-propyl) phosphate (TCPP), 13674-84-5
- Pentabromo diphenyl ether (BDE), 32534-81-9
- Octabromo diphenyl ether (BDE), 32536-52-0
- Bis(2-Ethylhexyl)-3,4,5,6- tetrabromophthalate (TBPH), 26040-51-7
- 2-Ethylhexyl-2,3,4,5-tetrabromobenzoate (TBB), 183658-27-7
- Hexabromocyclododecane (HBCD), 25637-99-4
- Tetrabromobisphenol A (TBBPA), 79-94-7
- Chlorinated paraffins, C10-C13, 85535-84-8
- Antimony trioxide, 1309-64-4

## SAB Responsibilities – advise DEP

- Specified in the law
  - Not less than every 3 years
  - The department (DEP) shall, in consultation with TURI, the SAB and any other relevant state agency, review, identify and recommend, if applicable, other chemical flame retardants that should be prohibited
  - Criteria for determining toxic hazard for new chemicals is provided in the law
- 3 initial questions at this time

# Advise DEP

## Q1.....Chemical analogues?

- In the law "any of the following chemical flame retardants or a chemical analogue"
- Definition in the proposed FR regulations:
  - Chemical Analogue: A compound having a structure similar to that of another compound, but differing from it in respect to a certain aspect. It can differ in one or more **atoms, functional groups, or substructures**, which are replaced with other atoms, groups, substructures, or in their arrangement.
- TURI/DEP identified possible analogues:
  - Reviewed reports from more than 30 organizations (universities, NGOs, governments) that have studied FRs, identified a list of approx. 200 chemicals, identified structurally similar chemicals to the 11, considered possible use in the product categories, chose 24 very closely related analogues for SAB consideration

# Advising DEP

## Q1:

- Is each proposed chemical analogue (identified by TURI/DEP) sufficiently similar to at least one chemical identified in the law such that the proposed analogue would be reasonably anticipated to have similar concerns re: toxic hazard, persistence, bioaccumulation?



## Advise DEP

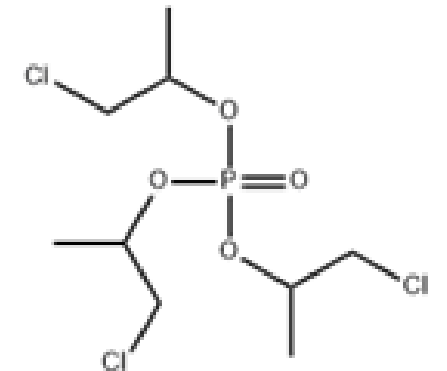
### Q2.....Multiple CAS numbers?

- Q2: When FR chemicals identified in the law are associated with more than one CAS number, should all CAS numbers be included?
- Example: Tetrabromobisphenol A
  - Most common CAS number is 79-94-7
  - Also 121839-52-9
- Example: Chlorinated paraffins
  - In the law as 85535-84-8, "short chain chlorinated paraffins"
  - Also 108171-26-2 "alkanes, c10-c12, chloro"

# Advise DEP

## Q3.....Isomers?

- Q3: Are isomers of the FRs identified in the law (when used as flame retardants themselves) chemical analogues per the definition?
- Example: Tris (1-chloro-2-propyl) phosphate (TCPP) 13674-84-5
  - Isomer: Tris(2-chloropropyl)phosphate (6145-73-9 and 26248-87-3)
  - Isomer: Bis(2-chloropropyl)(2-chloro-1-methylethyl phosphate) (76649-15-5)
  - Isomer: Bis(2-chloro-1-methylethyl)(2-chloropropyl)phosphate (76025-08-6)
  - Isomer: Bis(2-chloro-1-methylethyl)(3-chloro-1-propyl)phosphate (137909-40-1)
  - Isomer: Bis(3-chloro-1-propyl)(2-chloro-1-methyl)phosphate (no CAS number)
  - Isomer: Tris(3-chloropropyl)phosphate (1067-98-7)



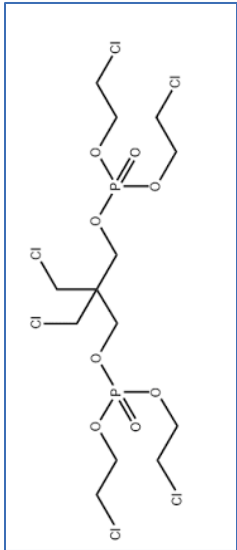
# CPSC/NAS subclasses –

The 11 chemicals fit into 7 subclasses:

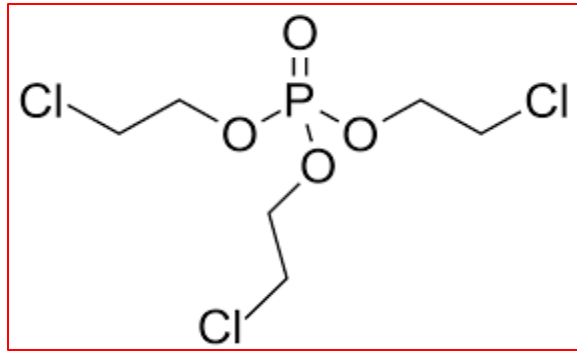
1. Polyhalogenated organophosphates (5)
2. Polyhalogenated diphenyl ethers (8)
3. Polyhalogenated alicycles (1)
4. Polyhalogenated phthalates/benzoates/imides (4)
5. Polyhalogenated bisphenol aliphatics (4)
6. Polyhalogenated aliphatic chains (0)
7. Inorganic (not included in NAS/CPSC subclasses) (2)

- 2015 petition to CPSC to ban certain products that contain nonpolymeric, additive, organohalogen FRs
- Requested NAS to conduct hazard assessment: Named 14 subclasses based on chemical structure, physicochemical properties, and predicted biologic activity
- 2016 Exposure assessment (9 FRs, 7 on MA FR Law)
- 2017 CPSC recommends that manufacturers of children’s products, upholstered furniture sold for use in residences, mattresses (and mattress pads), and plastic casings surrounding electronics refrain from intentionally adding nonpolymeric, organohalogen FRs (“OFRs”) to their products.

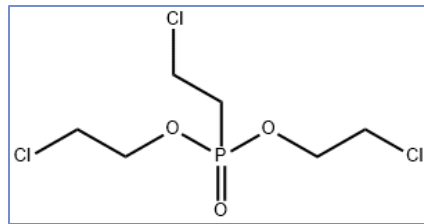
# Subclass 1 – Polyhalogenated Organophosphates



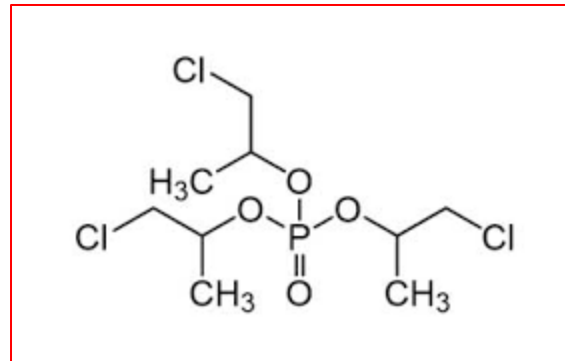
2,2-bis(chloromethyl)-propane-1,3-diyltetrakis(2-chloroethyl) bisphosphate



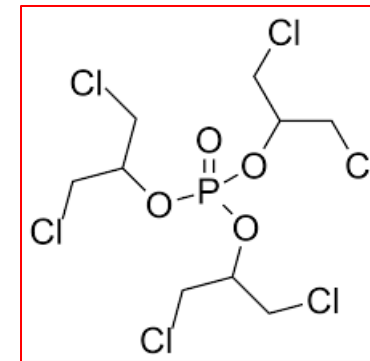
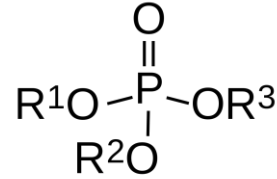
Tris(2-chloroethyl) phosphate (TCEP)



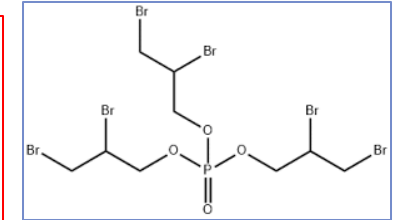
Bis(2-chloroethyl)2-chloroethylphosphonate



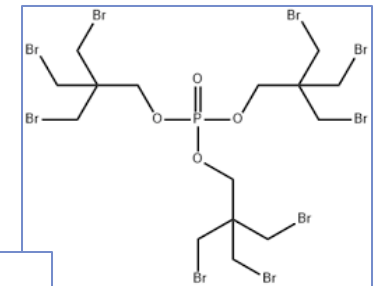
Tris(1-chloro-2-propyl)phosphate (TCPP)



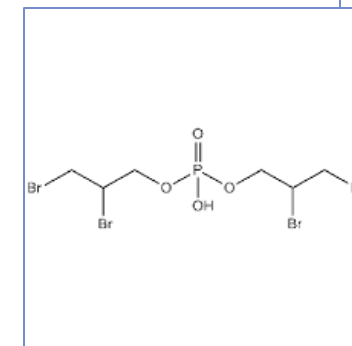
Tris(1,3-dichloro-2-propyl) phosphate (TDCPP)



Tris(2,3-dibromopropyl) phosphate (TDBPP)  
“Brominated tris” or “Tris”



Tris(tribromoneopentyl) phosphate

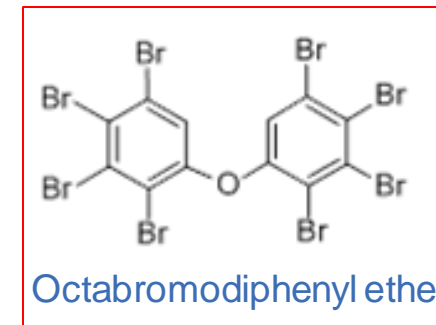
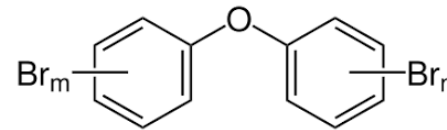
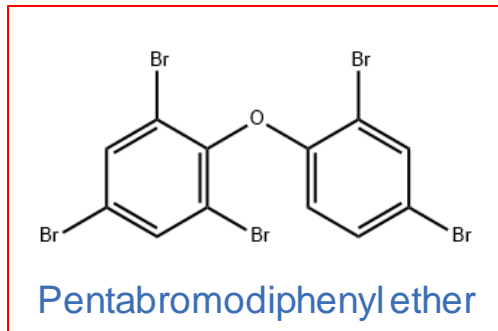


Bis(2,3-dibromopropyl)phosphate

TCEP, TCPP, TDCPP part of EPA's Chlorinated Phosphate Ester Cluster FRs TSCA Workplan (2015); general toxicity issues: carcinogenicity, reproductive toxicity, aquatic toxicity, respiratory sensitizer (due to being organophosphates), endocrine disruptors

Note: Chemicals in red boxes are identified in the FR Law; blue boxes are proposed analogues on slides 12-18.

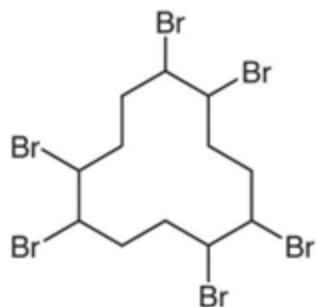
## Subclass 2 – Polyhalogenated diphenyl ethers



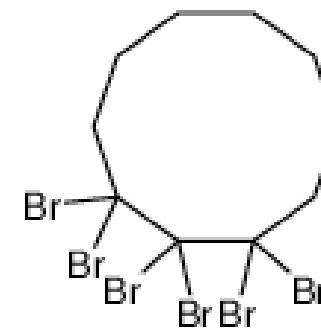
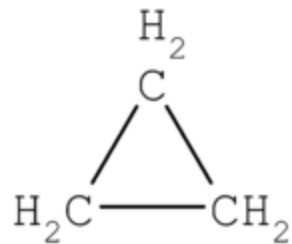
- Decabromodiphenyl ether
- Nonabromodiphenyl ether
- Heptabromodiphenyl ether
- Hexabromodiphenyl ether
- Tetrabromodiphenyl ether
- Dibromodiphenyl ether
- Monobromodiphenyl ether

Penta/Octa largely phased out of use in US 2004. SNUR 2006. General toxicity issues: endocrine disruption, PBT, developmental toxicity

## Subclass 3 – Polyhalogenated alicycles



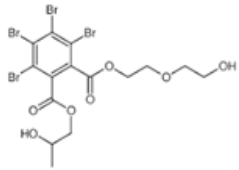
Hexabromocyclododecane  
 $C_{12}H_{18}Br_6$



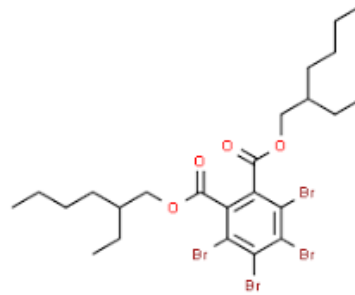
Hexabromocyclodecane  
 $C_{10}H_{14}Br_6$

On TURA list, Stockholm Convention phase out 2015. General toxicity issues: developmental toxicity, aquatic toxicity, PBT. Not usually used in product categories in the FR law.

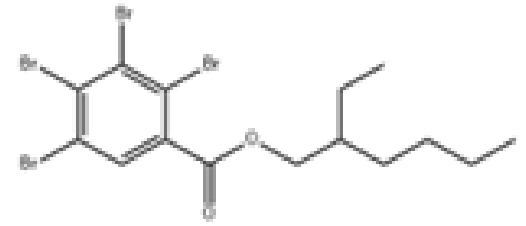
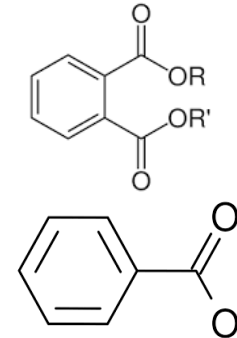
# Subclass 4 – Polyhalogenated Phthalates, Benzoates, Imides



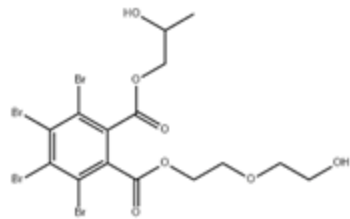
2-(2-hydroxyethoxy)ethyl-2-hydroxypropyl-3,4,5,6-tetrabromo phthalate



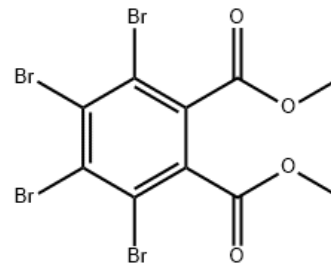
Bis(2-Ethylhexyl)-3,4,5,6-tetrabromophthalate (TBPH)



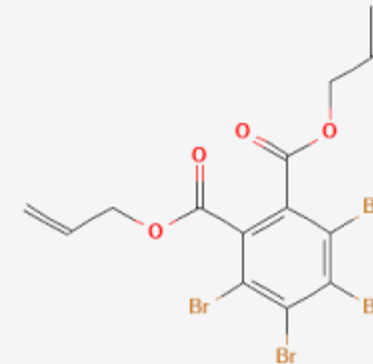
2-Ethylhexyl-2,3,4,5-Tetrabromobenzoate (TBB)



2-(2-hydroxyethoxy)ethyl-2-hydroxypropyl-3,4,5,6-tetrabromo phthalate mixed esters with diethylene and propylene glycol



Tetrabromophthalic acid dimethyl ester

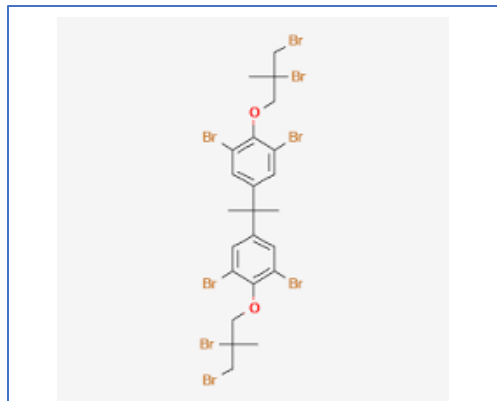


Diallyl tetrabromophthalate

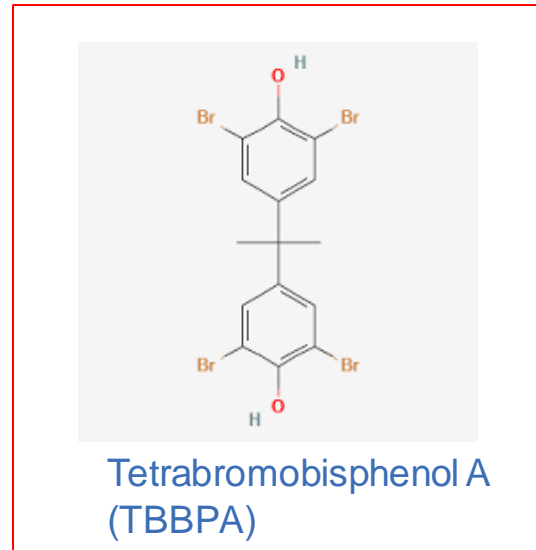
TBPH, TBB part of EPA TSCA Workplan (2015) for Brominated Phthalates Cluster. General toxicity issues: PBT, reproductive and developmental toxicity, aquatic toxicity

# Subclass 5 – Polyhalogenated Bisphenol Aliphatics

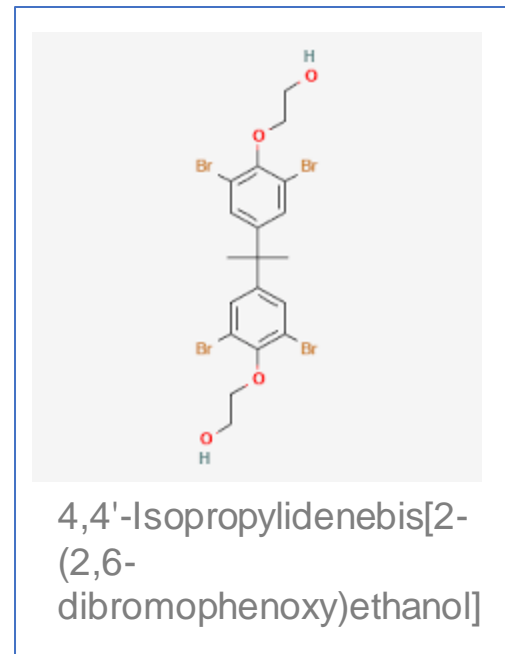
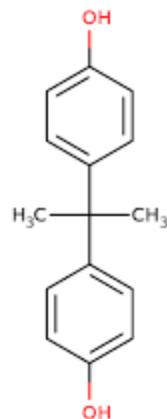
On TURA list, 100 lb threshold. TBBPA in EPA's "TBBPA and Related Chemicals Cluster FRs" TSCA Work Plan (2015). General toxicity issues: carcinogenicity, endocrine disruption, aquatic toxicity.



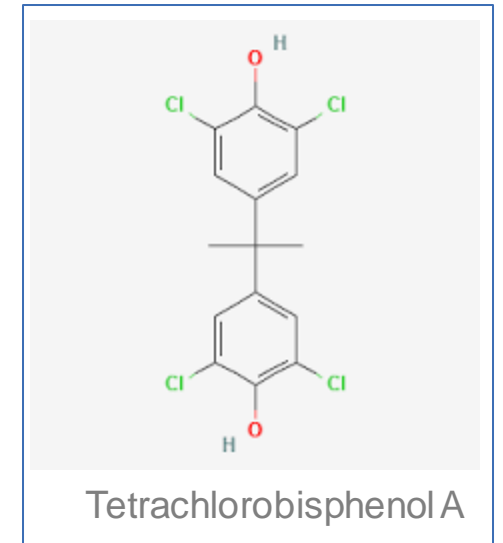
1,1'-  
(Isopropylidene)bis(3,5-dibromo-4-(2,3-dibromo-2-methylpropoxy)benzene)



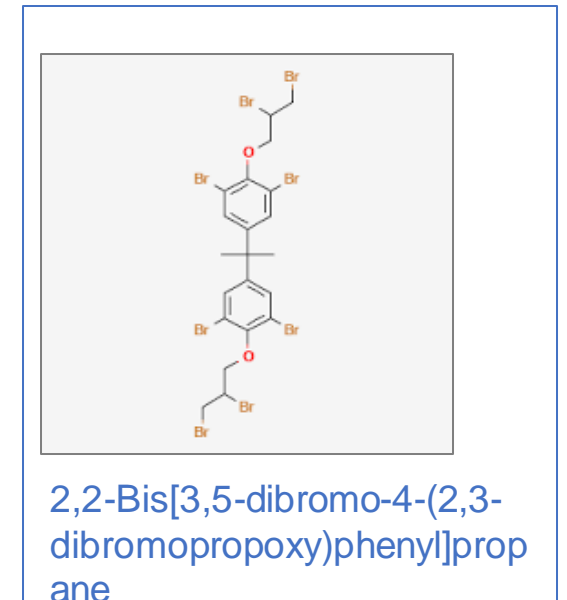
Tetrabromobisphenol A (TBBPA)



4,4'-Isopropylidenebis[2-(2,6-dibromophenoxy)ethanol]



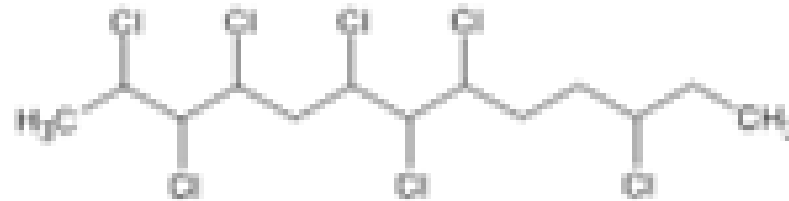
Tetrachlorobisphenol A



2,2-Bis[3,5-dibromo-4-(2,3-dibromopropoxy)phenyl]propane



## Subclass 6 – Polyhalogenated Aliphatic Chains



Short chain chlorinated paraffins

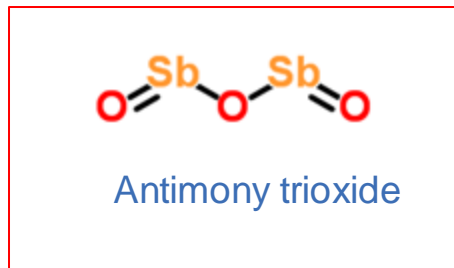
85535-84-8

$C_xH_{(2x-y+2)}Cl_y$

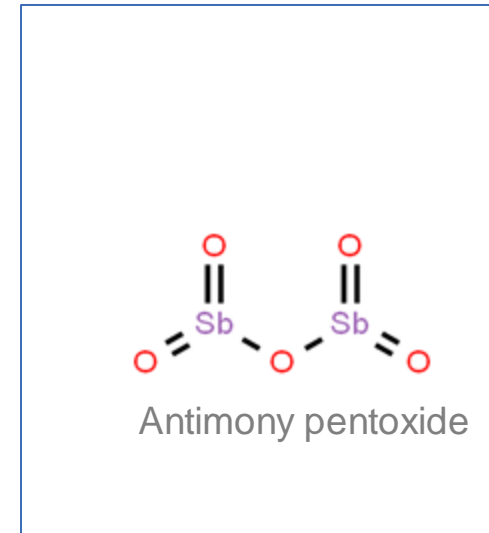
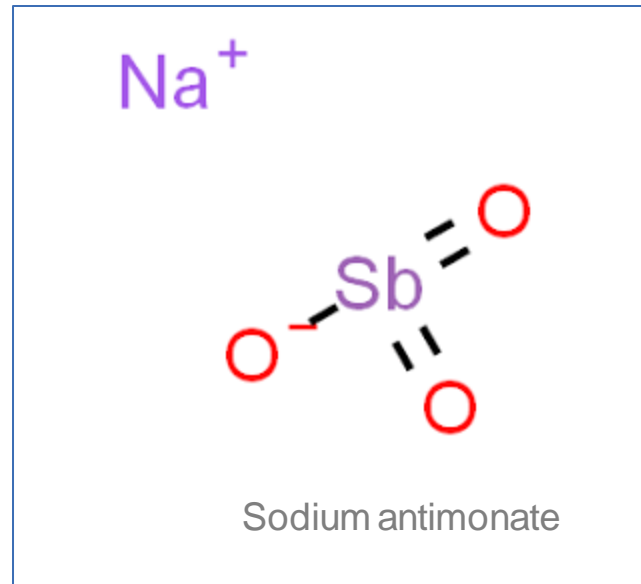
(where  $x = 10-13$ ;  $y = 3-12$ )

On TURA list as "polychlorinated alkanes, C10-13." EPATSCA Action Plan for SCCPs (2009). General toxicity issues: PBT, aquatic toxicity

# Subclass 7 - Inorganics



On TURA list as "antimony compounds." General toxicity issues: carcinogenicity, developmental and reproductive toxicity.



## Next meeting....

- Q1: Is each proposed chemical **analogue** (identified by TURI/DEP) sufficiently similar to at least one chemical identified in the law such that the proposed analogue would be reasonably anticipated to have similar concerns re: toxic hazard, persistence, bioaccumulation?
  - Q2: When FR chemicals identified in the law are associated with **more than one CAS number**, should all CAS numbers be included?
  - Q3: Are **isomers** of the FRs identified in the law (when used as flame retardants themselves) chemical analogues per the definition?
- 
- Goal for next meeting: SAB will discuss and vote on the questions by subclass or by question
  - What does the Board need?
  - TURI will provide "Proposed Analogues, Isomers and CAS no for SAB Consideration" - available in LibGuide by March 17