



Flame Retardants and Fire Safety

GC3 Webinar
Mar 2, 2017

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Why do we use Flame Retardants?

- We use polymerized fuels (hydrocarbons) as materials of construction
- Flame Retardants are an attempt to delay ignition of flammable materials



Fire safety and flammability standards,
building codes,
insurance co. standards

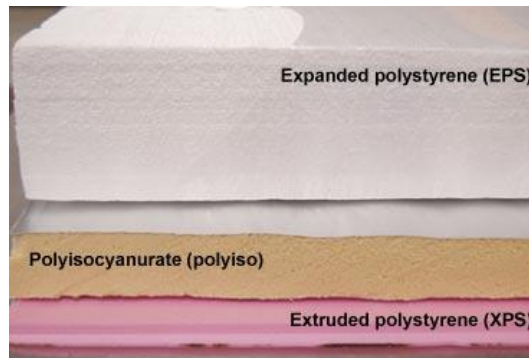
Flame Retardant (FR) Substances

- Halogens
 - Bromine (BFRs), Chlorine
- Phosphorous
- Antimony
- Metal salts and hydroxides
- Nitrogen
- Nano-clays

Flame Retardant Mechanisms

- Vapor phase inhibition – interrupt free radical production to limit combustion (e.g., halogenated FRs)
- Char formation – form carbonaceous layer on surface to insulate surface from fire (e.g., intumescent FRs, phosphorous, nitrogen)
- Non-flammable material – dilute polymeric fuel (e.g., inorganic mineral FRs), or use **non-flammable materials**

Where are flame retardants used?



<http://www.drenergysaver.com>



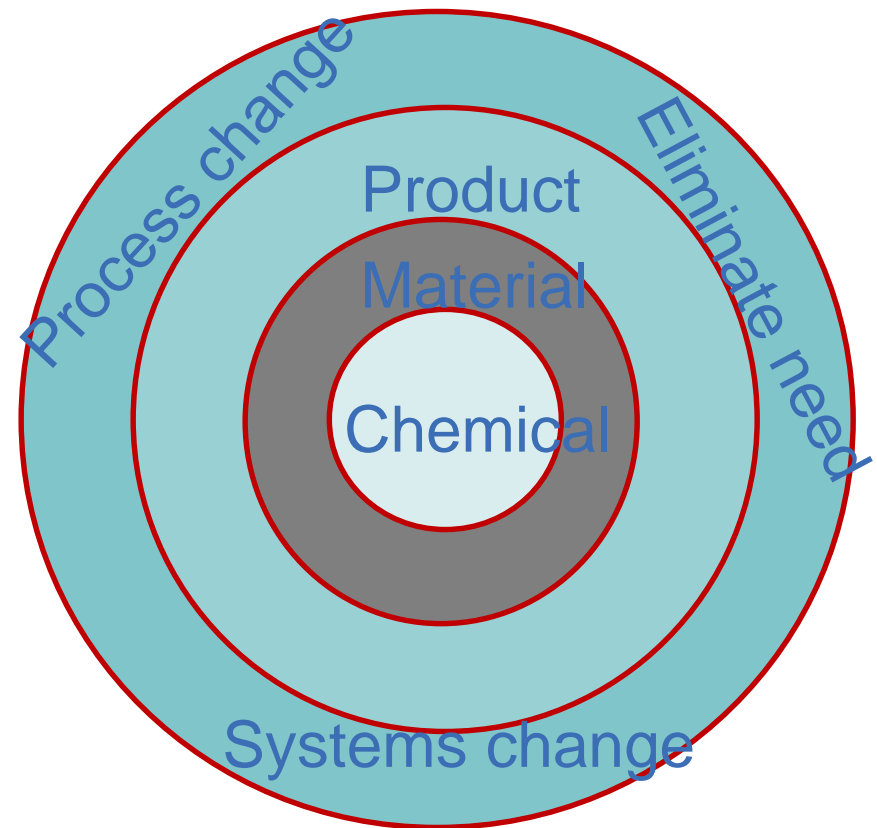
RTP Co.



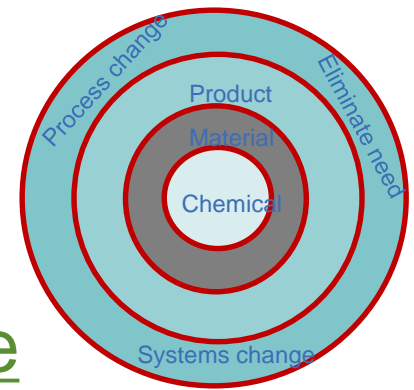
www.curtainhomesale.com

Analyze Functional Use

1. Chemical
2. Material
3. Product Re-design
4. Process Change
5. Eliminate the Use / Need for Function
6. Systems change



Furniture Flame Retardant Alternatives



Polyurethane foam cushions in furniture

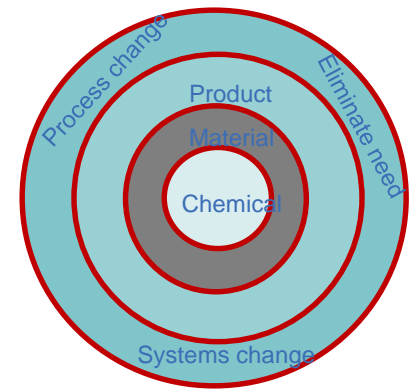
- Material: higher density foam, cotton or wool, feathers/down



- Product: plastic mesh (no foam), barrier fabric over



Furniture Flame Retardant Alternatives



Polyurethane foam cushions in furniture (cont.)

- Eliminate need: refine tests to determine whether FRs needed and in what products



Process change: sprinklers, other ways of extinguishing fires

- Systems change: less stuff, less of built environment from fuel

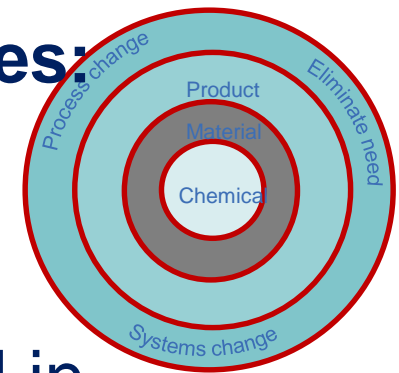


Credit: William Schulz/C&EN

Identify Flame Retardant Alternatives: Polystyrene Foam



Dow Chemical



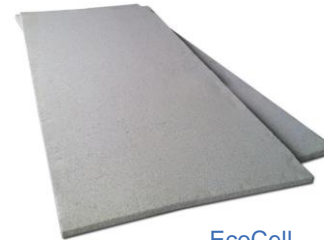
Building Insulation Foam – HBCDD used in rigid extruded polystyrene (XPS) foam

- Material – phenolic foam, fiberglass blanket, rock wool, cellulose

<http://www.subsport.eu>



CertainTeed Saint-Gobain



EcoCell



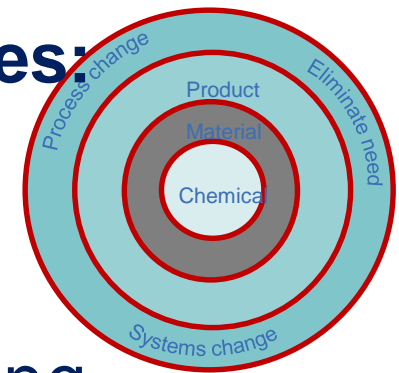
- Eliminate need – FR not required with thermal barrier (e.g., concrete)

Systems change: Code changes required



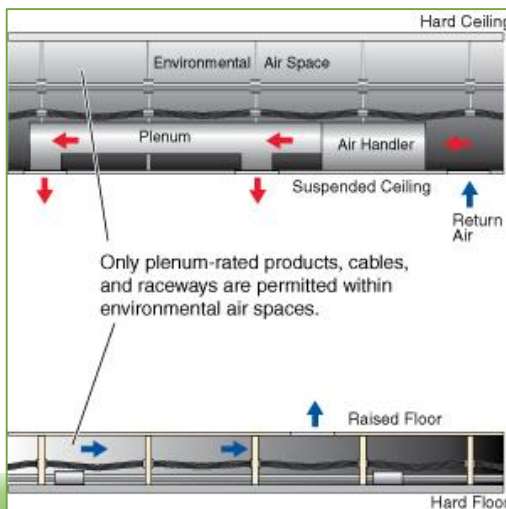
Building Science Corp.

Identify Flame Retardant Alternatives: Wire and Cable



Wire and Cable Insulation and Jacketing

- Material – Cross linked polyethylene (XLPE), polyphenylene oxide (PPO), thermoplastic polyurethane (TPU)
 - May use non-halogen FRs (metal hydroxide, phosphorus, nano-clays)



- Systems change – building design, eliminating wire and cable from plenum spaces

Extron Electronics

Belden, Inc.

Thank-you

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