

Fig. 1: FR treated vs. untreated chair

Source: www.nist.gov

FLAME RETARDANTS

„To burn or not to burn?“

FLAME RETARDANTS (FRs)

- Content of the presentation:
 - Overview – what, where, how?
 - Risk assessment – why do we care?
 - Sampling and analyses
 - Information gap
 - Conclusion



FRs – OVERVIEW

- What?
 - Chemicals that inhibit or delay the spread of fire
 - Halogenated (Cl, Br), Organophosphorus, Nitrogen
- Where?
 - Plastics, electronic circuit boards, building insulation materials, textiles, furniture

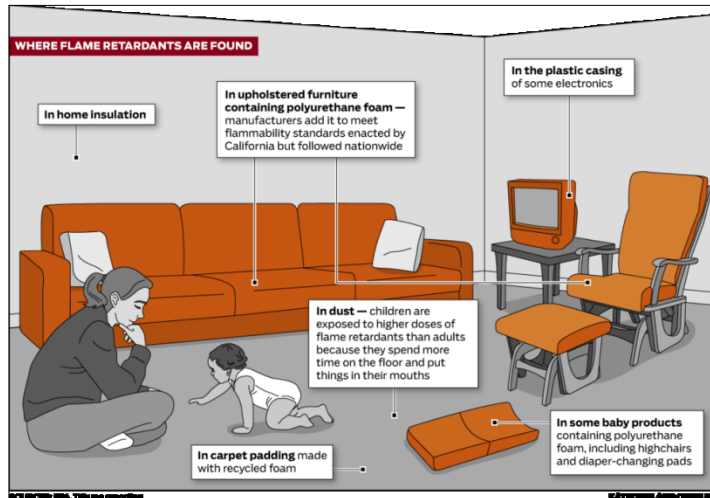


Fig. 2: Using of FRs

Source: www.sourcewatch.org



FRs – OVERVIEW

- How?

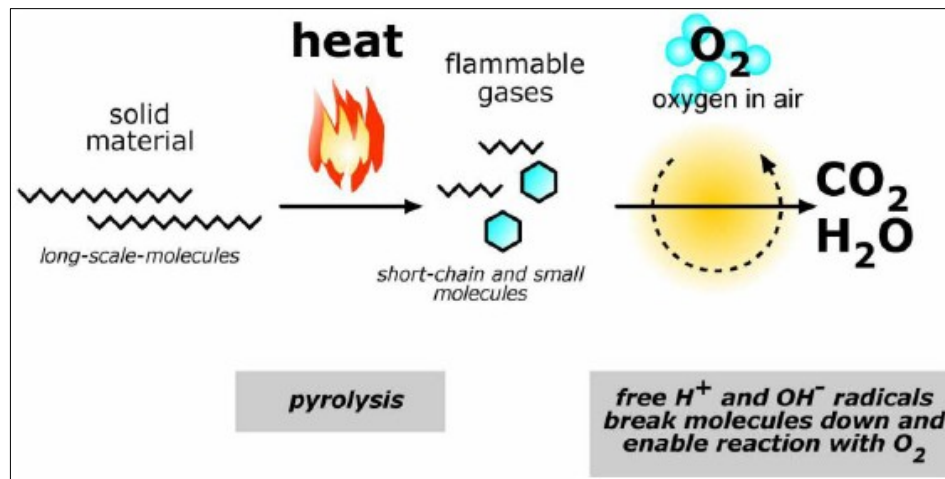


Fig. 3: Combusting process

Source: www.garmentstech.com

- (C)BFRs: interruption of radical chain mechanism in gas phase of combustion process
- OPFRs: release of water in solid phase + coating
- NFRs: release of inert gases



FRs – RISK ASSESSMENT

- Why do we care?
 - Persistency
 - Long-range transport
 - Bioaccumulation
 - Endocrine disruption
 - Carcinogenic



Fig. 4, Source: www.bcaction.org



Fig. 5, Source: www.saferchemicals.org



FRs – RISK ASSESSMENT

- Why do we care?
 - Chemicals of concern – PBDEs, HBCD, TBPH, TDCPP, TBB

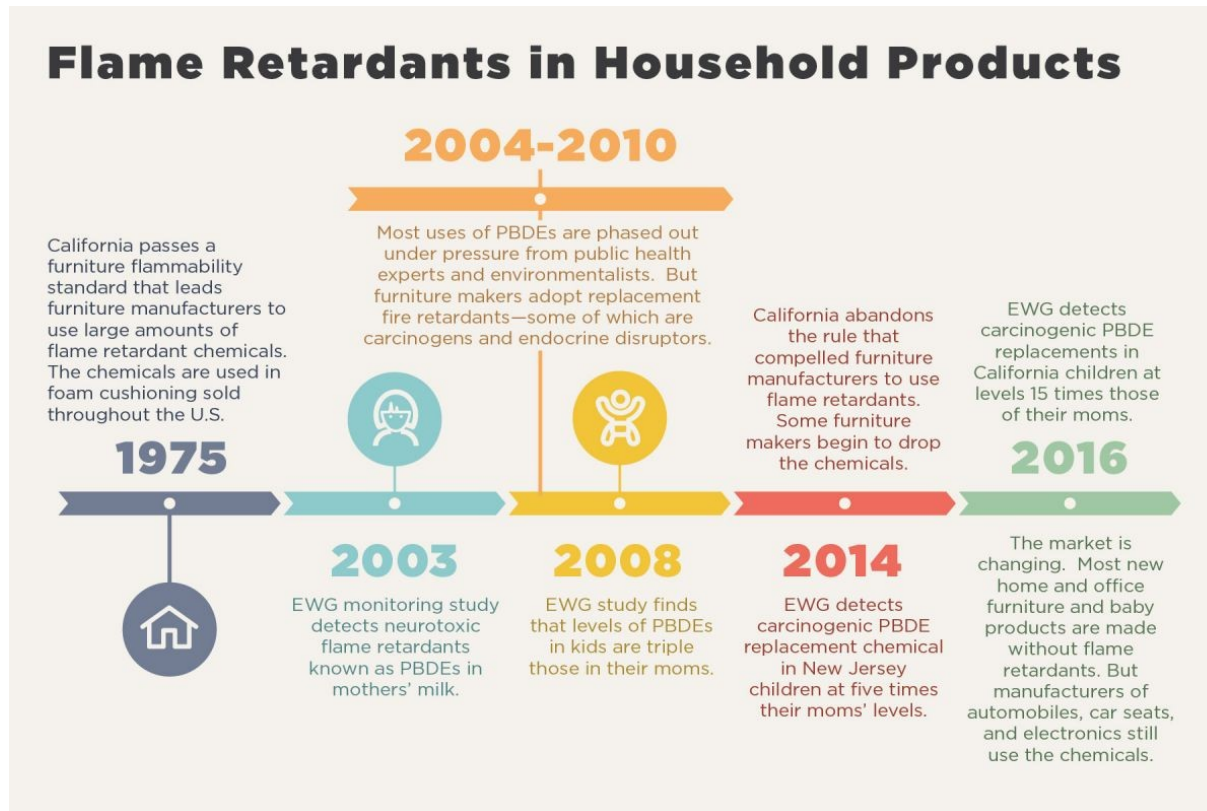


Fig. 6: FRs Timeline

Source:
www.ewg.org



FRs – SAMPLING AND ANALYSES

- Sampling
 - Dust collecting (vacuum cleaner)
- Extraction
 - acetone, toluene, hexane, DCM
 - Soxhlet, ultra-sonication, column with silicagel
- Analysis
 - GC-MS
 - LC-MS
 - LC-MS/MS



FRs – INFORMATION GAP

- Problem
 - Not enough information about real functionality
 - Not enough information about toxicity
- Ways to go
 - Functionality – test with basic/random objects (are they needed?)
 - Biomonitoring – long term (which & how are they toxic?)
 - Update legislation as a result



FRs – CONCLUSION

- "To burn or not to burn?"
 - Depends on situation
 - Consider risk on both sides
 - Search for alternatives



Fig. 7,

Source: www.firebuddy.co.nz



FRs – IMAGE SOURCES

- *Fig. 1:* https://www.nist.gov/sites/default/files/styles/1400_x_1400_limit/public/images/el/fire_research/15el003_burningchairs_lr.jpg?itok=OJhHnXY1
- *Fig. 2:* http://www.sourcewatch.org/index.php/Flame_Retardants
- *Fig. 3:* <http://garmentstech.com/why-need-to-know-your-clothing-are-flame-retardants-free/>
- *Fig. 4:* <https://bcaction.org/site-content/uploads/2012/11/take-action-flame-retardants.png>
- *Fig. 5:* <http://saferchemicals.org/sc/wp-content/uploads/sites/3/typepad/times-sq-couch.png>
- *Fig. 6:* <http://www.ewg.org/enviroblog/2017/02/flame-retardant-roulette-swapping-one-toxic-compound-another>
- *Fig. 7:* <http://firebuddy.co.nz/wp-content/uploads/2015/04/chip-pan-fire.jpg>
- *Fig. 8:* <http://memes.com/img/1128020>



FRs – END

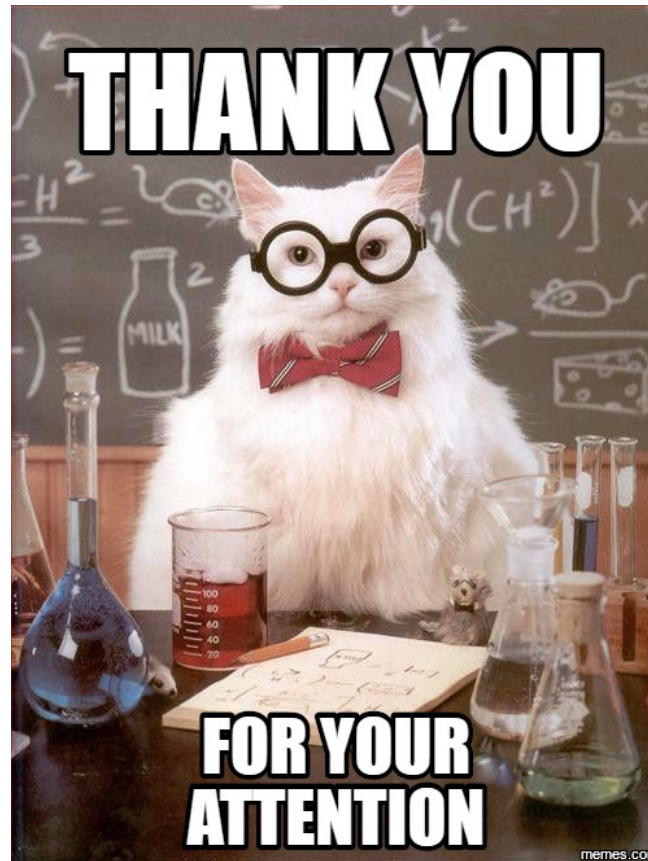


Fig. 8, Source: www.memes.com

