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TITLE

A study of flame retardants in lounge chairs and electronics, and their impact on emission, exposure, and flammability

BODY (293/300)

Chemical flame retardants (FRs) have been added in consumer products including furniture in order to meet flammability requirements. Due to recent changes in state-level regulations and/or other cases, FR usage is being reduced through elimination or replacement with more benign alternatives. Exposure to some FRs have been found to lead to health concerns such as cancer, thyroid disruption, delayed mental and physical development, advanced puberty, and reduced fertility.

This study examined chemical exposure levels from daily usage of residential chairs and electronics. All lounge chairs were constructed exactly the same except for the four different FR technologies applied: no FR; application of a textile fire barrier; use of polyurethane foam with an added organophosphorus FR; and use of polyurethane foam manufactured with a reactive FR. The studied electronics were a 55" TV and a 15" laptop. The chairs and the electronics were first measured for volatile organic compound (VOC) and semi-volatile organic compound (SVOC) emissions using an environmentally controlled chamber for inhalation, ingestion, and dermal exposure levels. Following chemical studies, the test products were burned in a controlled fire laboratory to measure flammability parameters and VOC/SVOC emissions from the burn.

Results show differences in chemical exposure and flammability performance among the different products and chair types. Added FRs were detected in some of the environmental samples during the environmental chamber exposure measurements. The fire barrier technology had the greatest impact on suppressing furniture combustion. With the amount of FRs added to the constructed chairs, the chemical FRs did not show a measurable fire suppression advantage over chairs without any FRs. The study also shows the presence of other chemicals that should be considered in evaluating chemical exposure risks during daily use and during ignition. This study provides scientific data to assess chemical exposure risks and flammability from furniture and electronics.

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