Healthier Vehicle Guide for Automakers

Reducing the use of harmful flame retardant chemicals in vehicle interiors

The problem: The United States Federal Motor Vehicle Safety Standard (FMVSS) No. 302, Flammability of Interior Materials, was implemented more than five decades ago to reduce deaths and injuries to vehicle occupants caused by vehicle interior fires, especially those initiated by matches or cigarettes. The easiest way to meet this standard is to add flame retardant chemicals (FRs), many of which are carcinogenic, neurotoxic, or endocrine disrupting, to vehicle interiors. The National Highway Traffic Safety Administration (NHTSA) does not have data demonstrating that FMVSS 302 improves safety. This means that:

- Manufacturers are incurring additional costs for chemicals that are associated with health and environmental harm
- Material quality is often degraded by chemical additives
- Workers & passengers are exposed to harmful chemicals
- Recycled materials are being contaminated with toxic flame retardants

The solution: Vehicle design changes and policy actions could allow manufacturers to reduce the use of flame retardants while maintaining or improving fire safety.

1. Encourage NHTSA to update FMVSS 302 to reduce the need for flame retardants. This is the best way to stop the need for harmful flame retardants in cars. As FMVSS 302 is over 50 years old and does not have data to support its efficacy, NHTSA should update this vehicle interior flammability standard. As finding safer ways to prevent vehicle fires is beneficial to automotive brands and the health of their workers and consumers, brands should encourage NHTSA to update FMVSS 302.

2. Eliminate all unnecessary flame retardant usage: Analyze product designs and supply chains for flame retardant chemicals that are used in excess of what is needed to meet flammability tests. This sometimes occurs due to continuing status quo usage when design changes might have allowed manufacturers to decrease FR usage; overspecification, when materials are more flame-resistant than is required (e.g. using V-0 rated plastic when V-2 plastic would suffice); or lack of transparency in the supply chain (e.g. suppliers providing materials with unneeded FRs because of excess supply).

3. Change material designs to meet FMVSS 302 without flame retardant chemicals. Oftentimes, flame retardant chemicals can be removed with smart design changes. Examples include changing the weave direction of a fabric, replacing highly flammable materials such as polyurethane foam with inherently less flammable materials, and changing the type of plastic used. For vehicle seats, vehicle manufacturers can follow the steps of the infant & child car seat industry, which often meets FMVSS 302 with wool or polyester seat fabrics adhered to dense foam. Such design changes also protect manufacturers from future flame retardant regulations, as avoiding FRs altogether can help manufacturers save the time and cost of switching from one chemical to the next with each new regulation.

4. Eliminate Prop 65 chemicals and organohalogen flame retardants. Some chemicals detected in today's vehicles are on California's Proposition 65 List as carcinogens (e.g. TCEP & TDCIPP). Other flame retardants are similar organohalogen chemicals that are likely to cause similar harms, and non-halogenated organophosphate esters are increasingly being associated with similar health harms as well. Phasing out halogenated chemicals will reduce exposure to dioxins and furans formed when materials with halogenated chemicals burn.

5. Request safer materials and increased transparency from shared suppliers. Utilize the process established for PFAS to better understand the types, quantities, & efficacies of FRs used in different materials and search for less-toxic alternatives. When requesting safer materials, keep in mind that just because a chemical is not restricted, e.g. under REACH, it may still cause harm. When FRs cannot be eliminated through design changes, use hazard assessments from reputable third-party organizations to find the most benign replacement. If the entire automotive industry demands safer materials and increased transparency from their suppliers, the process will be easier and less costly.

Frequently Asked Questions

Q: Aren't flame retardant chemicals supposed to reduce fires?

A: In theory, yes. However, FRs only help when they are well-matched to the fire source and intensity. FMVSS 302 is a small open flame test, so FRs added to pass that test will only result in a small delay of a small fire. For fires that start in engines after collisions, as is most common, the intensity of the fire when it reaches the vehicle interior is too great for FRs in vehicle seats and other materials to provide a meaningful benefit in stopping the fire. FRs in printed circuit boards and inside electronics can help prevent electrical fires. Overall, vehicle fires have decreased over the past few decades (with FMVSS 302 remaining the same), likely due to decreased smoking, improvements in vehicle safety, and the transition to electric vehicles.

Q: We already removed PBDEs - is that enough?

A: Unfortunately, PBDEs aren't the only flame retardants associated with harm. Other organohalogens, as well as organophosphate esters, are also toxic, bioaccumulative, and persistent, and have been shown to contaminate ecosystems worldwide.

Q: How is it known that FMVSS 302 is not beneficial?

A: NHTSA has confirmed verbally and in this document that they do not have statistical data or fire testing results to confirm that FMVSS 302 helps prevent fires or fire injuries. On the other hand, a number of studies confirm FR exposure from vehicles and the serious health harm to our population from flame retardants. This is why NHTSA should update FMVSS 302.

Q: Why now?

A: Many flammability standards were created in the 1970s due to increased fires from smoking and higher use of synthetic materials. However, in recent years, these standards have been modified based on new data on fires, flammability, and flame retardant toxicology. For example, the furniture flammability standard TB 117 was updated in 2013 from a standard that led to foam being about 5% FR to a standard that modestly increased fire safety without the need for flame retardants. Similarly, the California tent flammability standard was just updated so that FRs are no longer needed.

Q: Are there vehicle brands with less flame retardant use than other brands?
A: It does not seem so. Even within a single brand, vehicles have vastly different concentrations of FRs as well as different FRs identified. While some of these differences may be due to variations in how consumers use the vehicles (e.g. some opening windows more than others), it suggests that chemicals are selected based on availability and cost rather than specific decisions on FR usage.

Q: Are there concerns for worker exposure?
A: Most FRs are not bonded to the materials they are in and are semi-volatile, meaning they migrate out of products into air and dust and end up in people and the environment. Workers should be protected from both dermal and inhalation exposure, which should also be further studied.

Q: What other chemicals should automakers be concerned about?
A: In addition to flame retardants in vehicle interiors, automakers should also reconsider their use in in plastic components and use flame retarded (e.g. V-1) plastics only where there is a demonstrated benefit. PFAS chemicals in batteries, vehicle interiors, electronics, and refrigerant gases should be eliminated as quickly as possible due to their persistence and health harm. Care should also be used around recycled materials - while these are beneficial for the circular economy, they often contain higher levels of harmful chemicals.

Summary: Flame Retardants Found in Vehicles

- All cars had at least one type of flame retardant (FR) detected
- TCIPP, a likely carcinogen, found in 99% of cars
- FR concentrations 2-5x higher in summer compared to winter
- Presence of TCIPP in seat foam resulted in ~4x higher air sampler concentrations in winter and ~9x higher in summer

Proposition 65 Chemicals in Cars

- TDCIPP found in 23-59% cars (winter-summer)
- TCEP found in 14-44% of cars (winter-summer)

What about infant car seats?

- FR-free car seats are available, but tend to be more expensive
- Children in FR-free car seats are still exposed to these chemicals through the air and dust in the car

Don't flame retardants help?

- FRs help only in some situations; no proven benefit in car interiors
- FRs can make smoke denser & more toxic, impeding escape and harming passengers & first responders

Read our peer-reviewed paper on flame retardants found in cars here.

For additional questions or to learn about the flame retardants found in your brand's vehicles, contact Lydia Jahl at Lydia@GreenSciencePolicy.org.