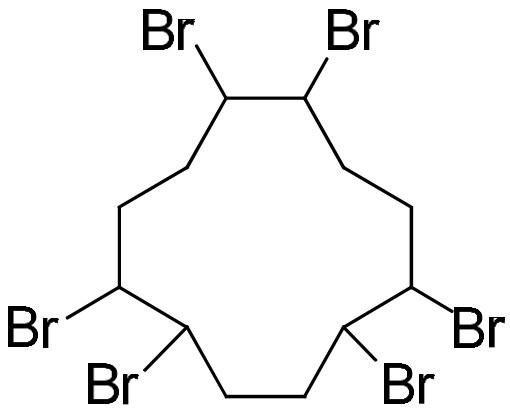
February 2017
Office of Chemical Safety and
Pollution Prevention
U.S. EPA

Preliminary Information on Manufacturing, Processing, Distribution, Use, and Disposal:

Cyclic Aliphatic Bromide Cluster (HBCD)

CASRNs:
25637-99-4
3194-55-6
3194-57-8



February 2017

Support document
for Docket EPA-HQ-OPPT-2016-0735

This document provides a preliminary public summary of available information collected by EPA's Office of Pollution Prevention and Toxics (OPPT) in the Office of Chemical Safety and Pollution Prevention (OCSPP) on the manufacturing (including importing), processing, distribution in commerce, use, and disposal of this chemical. This is based on existing data available to EPA, including information collected under the Chemical Data Reporting rule, information from other Agency databases, other U.S. Government agencies, publicly available information from states, and a review of published literature. In addition, the document includes information reported to EPA by producers and users of the chemical in the United States and in other countries.

This preliminary use information and any additional use information received in the docket by March 15, 2017 will inform efforts to develop the scope of the chemical risk evaluation required under section 6(b)(4) of the Toxic Substances Control Act, and will inform any risk management efforts following risk evaluation.

Mention of trade names in this document does not constitute endorsement by EPA. To verify products or articles containing this chemical currently in commerce, EPA has identified several examples. Any lists are provided for informational purposes only. EPA and its employees do not endorse any of the products or companies.

This document does not contain confidential business information (CBI).

The cyclic aliphatic bromide cluster identified in EPA's 2012 TSCA Work Plan for Chemical Assessments includes three chemicals whose CASRNs are listed on the previous page. There are no known uses of the third chemical, 3194-57-8. Therefore, for the purpose of this document, the use of the term "HBCD" refers to either CASRN (25637-99-4 and 3194-55-6), or both. (See EPA Problem Formulation, 2015)

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CONTACT

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MANUFACTURING, PROCESSING AND USE

1. Manufacturing (Including Importing)

Data reported for the Chemical Data Reporting (CDR) period for 2016 for HBCD indicate that between 1 and 10 million pounds of HBCD were manufactured in or imported into the United States in 2015; in 2014, 2013, and 2012, between 10 and 50 million pounds of HBCD were manufactured (including imported) each year [1, 2]. The precise production volume is confidential business information (CBI). HBCD is manufactured or imported as a powder or pellets and incorporated into a polymer matrix such as polystyrene foam. (EPA Problem Formulation, 2015, section 2.4.1)

Some companies that reported information to CDR have announced their intention to discontinue manufacturing HBCD.[3]

While HBCD has recently been listed as a chemical required to be reported to the Toxics Release Inventory (TRI), reports have not yet been submitted and data are not available.

Manufacturing Process

Industries that manufacture HBCD are classified in the North American Industry Classification System as NAICS 325 Chemical Manufacturing.

The following describes a method of manufacturing HBCD:

[1] Manufacturers (including importers) are required to report under CDR if they meet certain production volume thresholds, generally 25,000 lb or more of a chemical substance at any single site. Reporting is triggered if the annual reporting threshold is met during any of the calendar years since the last principal reporting year. In general, the reporting threshold remains 25,000 lb per site. However, a reduced reporting threshold (2,500 lb) now applies to chemical substances subject to certain TSCA actions. https://www.epa.gov/chemical-data-reporting/how-report-under-chemical-data-reporting

[2] Manufacture means to manufacture, produce, or import for commercial purposes. Manufacture includes the extraction, for commercial purposes, of a component chemical substance from a previously existing chemical substance or complex combination of chemical substances. (40 CFR 711.3)
https://www.epa.gov/sites/production/files/2015-12/documents/cdr_fact_sheet_importers_final_dec2015_0.pdf

[3] http://building.dow.com/en-us/newsroom/2016/20161117a (November 17, 2016);
http://www.plasticstoday.com/content/basf-switches-greener-polyfr-flame-retardant-ps-insulation-foam-portfolio/9557530021539 (November 25, 2014);
http://www.chemanager-online.com/en/news-opinions/headlines/basf-opposes-extension-hbcd-flame-retardants (June 20, 2014);
http://www.prnewswire.com/news-releases/albemarle-to-discontinue-production-of-hbcd-based-flame-retardants-to-focus-on-supplying-greencrest-polymeric-fire-safety-solutions-300262776.html (May 4, 2016); and
http://investor.chemtura.com/releasedetail.cfm?releaseid=936673 (October 14, 2015)

> "Produced by the addition reaction of bromine to trans, trans, cis-1,5,9-cyclododecatriene, the cyclic trimer of butadiene. The hexabromocyclododecane that is obtained from this reaction consists of a mixture of stereoisomers of 1,2,5,6,9,10-hexabromocyclododecane ranging from oils to an isomer with a 205-208 deg C melting point. Commercially available hexabromocyclododecane contains a mixture of solid isomers and has a melting point range of 170-180 deg C (185-195 deg C)."

Ullmann's Encyclopedia of Industrial Chemistry. 6th ed.Vol 1: Federal Republic of Germany: Wiley-VCH Verlag GmbH & Co. 2003 to Present, p. V5 625 (2003).

2. Processing

Processing[4] of HBCD includes the following uses, which were reported to CDR during the 2016 reporting period:

- Processing into a reactant or incorporation into a formulation, mixture, reaction product, or article
- Basic inorganic chemical manufacturing
- Plastic material and resin manufacturing
- Plastics product manufacturing
- Flame retardants, intermediates, other

In 2015, EPA found that the majority of HBCD was used as a flame retardant in Expanded Polystyrene (EPS) and Extruded Polystyrene (XPS) products such as insulation boards in building construction. (EPA Problem Formulation, 2015, section 2.2.2.1) HBCD is incorporated into a polymer matrix such as polystyrene foam. (EPA Problem Formulation, 2015, section 2.4.1)

[4] The term "process" means the preparation of a chemical substance or mixture, after its manufacture, for distribution in commerce—
(A) in the same form or physical state as, or in a different form or physical state from, that in which it was received by the person so preparing such substance or mixture, or
(B) as part of an article containing the chemical substance or mixture.
http://uscode.house.gov/view.xhtml?path=/prelim@title15/chapter53&edition=prelim

Table 1: Possible Processing Industries:

NAICS CODE	NAICS TITLE
32521	Plastics Material and Resin Manufacturing
325991	Reformulating plastics resins from recycled plastics products
424690	Other Chemical and Allied Products Merchant Wholesalers
326140	Polystyrene Foam Product Manufacturing
326199	Radio housings, plastics, manufacturing
6140	Sheet (i.e., board), polystyrene foam insulation, manufacturing
313312	Textile and Fabric Finishing (except Broadwoven Fabric) Mills
313320	Fabric Coating Mills
314110	Carpet and Rug Mills
314999	All Other Miscellaneous Textile Product Mills
337127	Institutional Furniture Manufacturing
336360	Motor Vehicle Seating and Interior Trim Manufacturing

The following information on processing of HBCD into insulation boards and textiles is from "EPA Design for the Environment Alternatives Assessment for HBCD," 2014, pp 2-5, 2-6) https://www.epa.gov/sites/production/files/2014-06/documents/hbcd_report.pdf)

Processing of HBCD in Expanded Polystyrene (EPS)

EPS is a rigid foam insulation produced by expansion and molding of expandable polystyrene resin beads. To manufacture EPS, first a polystyrene resin is produced via suspension polymerization by chemical manufacturers. HBCD and a blowing agent, usually pentane, are added to the resin during the polymerization process. Synergists are often used with HBCD in EPS foam to allow the concentration of HBCD to be reduced. There is also a less economical two-step technology for manufacturing EPS resin that for the most part has been replaced with the one-step process described here (Grant 2011).

The expandable resin is sold and transported to molders to create EPS foam. At the molding plant, the polystyrene resin is first expanded into foam beads via the direct application of steam, which causes the blowing agent in the resin to expand. Following an aging/maturing step of approximately 2 to 24 hours, the expanded foam beads are molded into rigid closed-cell foam. This process produces blocks of foam which are cut to desired shapes (such as insulation board) and thicknesses with hot wires (COWI 2011; EPS Industry Alliance 2011a). Alternatively, the expanded foam beads may be molded into custom shapes to produce rigid foam construction elements, such as ICFs. This process typically takes place at temperatures of 120°C (COWI 2011) or below. Trim scrap from the cutting operation can be recycled into the molding operation under controlled conditions while maintaining required properties. Molding plants are typically strategically located around the country to minimize the shipping costs of transporting the lightweight foams to end users.

Processing of HBCD in Extruded Polystyrene (XPS)

XPS is a rigid foam insulation board produced by an extrusion process. To manufacture XPS, polystyrene resin granules and additives, including blowing agents (typically hydrofluorocarbons (HFCs) and flame retardants (i.e., HBCD), are mixed in an extruder. The resulting mixture is melted at high

pressure and high temperatures (ranging from 180-230°C) into a viscous plastic fluid. Due to these high processing temperatures, HBCD is stabilized with chemical additives to limit effects of any HBCD decomposition during manufacture, as is discussed in more detail below. Next, the viscous fluid is forced through a die, expanded into a foam and shaped. The foamed mixture is cooled into continuous sheets (boards) of closed-cell insulation. The boards are cut to size and production waste is reprocessed (Wilson 2005; COWI 2011; Extruded Polystyrene Foam Association 2011a; Fabian 2011).

Processing of HBCD in Textiles

For use in textiles, HBCD is formulated into polymer-based dispersions (e.g., acrylic or latex) of variable viscosity, which are then processed in the textile finishing industry (Harscher 2011).

3. Products and Articles

The products and articles that may contain HBCD are described in EPS, XPS, and textile descriptions above.

4. Distribution

Based on information reported to CDR for 2016, six facilities manufacture or import HBCD for wholesale and retail trade. HBCD is available for purchase online from chemical suppliers.

5. Use

Major commercial use:

The main use of HBCD in the US is as a flame retardant in expanded polystyrene foam (EPS) and extruded polystyrene foam (XPS) (UNEP, 2010; Weil and Levchik, 2009). Use in EPS and XPS accounts for 95 percent of all HBCD applications and began in the 1980s (EPA, 2014b; UNEP, 2010).

EPS and XPS are used in the US for thermal insulation boards and laminates for sheathing products used in the building and construction industry. In addition, EPS is used to provide protection from moisture, prevent freezing, provide a stable fill material, and create high-strength composites in construction applications. XPS foam board is used mainly for roofing applications and architectural molding. HBCD is used in both types of foams, because it is highly effective at low-use levels, and therefore maintains the insulation properties of the EPS and XPS foam (Morose, 2006). EPS boards contain approximately 0.5 percent HBCD by weight in the final product while XPS boards contain 0.5 to 1 percent HBCD by weight (Extruded Polystyrene Foam Association, 2011; Morose, 2006). (Source for this subsection: EPA Problem Formulation, 2015, section 2.2.1)

Minor commercial uses:

In the United States, HBCD was historically used as a flame retardant in the backcoating of textiles. However, supported by information gathered from research, industry, and consumer product

organizations, EPA/OPPT believes that HBCD is no longer used in consumer textile applications outside of the auto industry. EPA/OPPT received information from a group of textile formulators that the end uses of HBCD-containing textiles are for military, institutional, and aviation applications such as durable carpet tiles for hospitals or prisons (EPA, 2012e; Friddle, 2011). Use in this application is quite small; in 2005 only 1 percent of total production volume of HBCD was used in textiles in the US (EPA, 2012e). HBCD is typically found in textile back coatings at levels of 10-25 percent (Harscher, 2011). (Source for this subsection: EPA Problem Formulation, 2015, section 2.2.2.2.)

Uses in Consumer Products

In 2011, EPA investigated use of HBCD in textiles available for sale to consumers. The only uses were in floor mats, headliners, and possibly other interior fabrics in automobiles made in or imported to the US (EPA, SNUR 2015). HBCD is currently regulated under Annex XIV of European Union's Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), which set a "sunset date" for the use of the chemical of August 21, 2015. In response to the REACH regulation, the auto industry has formed a consortium to help US manufacturers understand the new requirements; develop tools, processes and best practices; and coordinate compliance efforts. The consortium consists of five North American sponsoring companies: Chrysler, Ford, General Motors, Honda, and Toyota (AIAG, 2011). It is likely that as companies discontinue the use of HBCD in European cars to comply with the REACH regulation, they will discontinue its use in North American automobiles as well. (EPA Problem Formulation, 2015, section 2.2.2.2.1)

A very small number of individual consumer items containing HBCD were recently identified by the state of Washington: a plastic protective glove (material also identified as "glove rubber palm fabric") and a bean bag chair. https://fortress.wa.gov/ecy/publications/documents/1404021.pdf

The Ecology Center in Ann Arbor, Michigan tested for flame retardant chemicals in child car seats for automobiles. In a 2016 report, the center identified brominated cyclododecanes (without determining the degree of bromination) in two car seats. The Ecology Center expects that these chemicals are HBCD. See page 10 at: http://www.ecocenter.org/healthy-stuff/pages/download-print-report-graphics

Past and potential other uses

EPA identified potential end-products identified by EPA in 2015 based on data from the Consumer Product Safety Commission in 2001 and the European Chemicals Agency (ECHA) in 2008 and 2009:

- Insulation in non-construction application (e.g. refrigerated transport)
- Insulation boards against frost heaves of road and railway embankments
- High impact polystyrene (HIPS) for electrical and electronic equipment such as refrigerator lining, wire and cable applications, computers
- Distribution boxes for electrical lines
- Upholstered furniture, draperies, wall coverings, and interior textiles such as roller blinds

Source: (See EPA Problem Formulation, 2015, p. 20, 68)

Potential Uses Based On Current International Uses of HBCD:

Researchers in the Republic of Korea detected HBCD in food-related polystyrene products and buoys used for oyster farming. http://dx.doi.org/10.1016/j.chemosphere.2014.02.022

The Australian Department of Health and Aging reports that minimal amounts of HBCD are used in industrial packaging including packaging durable goods and beanbag fill and imported into the country already incorporated into various articles such as inkjet printers, projectors, scanners, ventilation units for offices, compact fluorescent lights, and LCD digital audiovisual systems (NICNAS, 2012). There are no data to indicate that HBCD is used in the US for these uses. (Source for this subsection: EPA Problem Formulation, 2015, section 2.2.2.2.

6. Disposal of Waste and Recycling/Recovery

Disposal of Waste

TRI data are not yet available for HBCD, but releases from industrial sites to waste water treatment plants (WWTP), surface water, air and landfill are expected (EC, 2008; Environment Canada, 2011; NICNAS, 2012). HBCD is expected to remain largely immobile in landfills (EPA, 2014) and therefore industrial releases to water and air are of greater interest to EPA/OPPT than industrial releases to landfills. Disposal of EPS and XPS may result in releases to the environment as a result of demolition of buildings or material that is left on or in the soil (EPA, 2014); EPA/OPPT believes these releases are likely to be lower than industrial releases on a per-site basis. (Problem Formulation, Section 2.4.1)

Recycling and Recovery

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Polystyrene insulation board may be recycled into new polystyrene boards or other applications (European Commission 2008; Sall 2010). Polystyrene is easier to recycle compared to other foam insulation materials because it can be melted and reformed with minimal chemical modification (U.S. Department of the Interior n.d.). To do so, the polystyrene is melted and re-expanded into insulation or packaging (Wilson 2005). For example, used EPS insulation boards may be ground up and molded with virgin EPS to form new boards (European Commission 2008).

Similarly, XPS may also be melted and reused in the manufacture of new insulation board (Herrenbruck n.d.). Due to the use of flame retardants (i.e., HBCD), as well as the dust and dirt accumulated during use and removal, used EPS and XPS can typically only be recycled into building insulation, and cannot be recycled into non-building applications, such as packaging (U.S. Department of the Interior n.d.). Although there is some recycling of polystyrene insulation in Europe – for example, Germany collects used polystyrene and recycles it into building insulation on a national level (European Commission 2008) – it is unclear to what extent the recycling of EPS and XPS takes place in the United States (Herrenbruck n.d.). (EPA Design for the Environment Alternatives Assessment for HBCD, 2014, Section 2.2.1)

USEFUL TYPES OF INFORMATION

This document presents a summary of information currently available to EPA on this chemical. To more fully characterize the manufacturing, processing, distribution, disposal, and use of this chemical, and to inform the development of the scoping document for this chemical, EPA is interested in obtaining additional information on:

- the expected trends in manufacturing and import volumes of this chemical;
- the overall number and location of sites which process, distribute, use, recycle, or dispose of the chemical;
- the functional uses for this chemical;
- which industry sectors use this chemical;
- what concentrations (weight fraction) of the chemical are used in industrial, commercial, and consumer applications;
- what types of products or articles contain this chemical;
- what are patterns of distribution, e.g. internet sales;
- what volume of the chemical is used for each type of use (e.g. insulation, textiles);
- which uses have been discontinued or phased out;
- the likelihood that other chemicals will replace this chemical and what are they;
- the likelihood that HBCD will replace other flame retardants that are phasing out;
- uses for recycled HBCD-containing materials;
- approximate number and description of individuals who can be exposed to the chemical, e.g. industrial workers, commercial workers, high-frequency consumer use, low-frequency consumer use, children, etc; and
- the typical setting for use (e.g. outdoors, indoors, industrial commercial, residential, vehicular)

APPENDIX: SOURCES CONSULTED

- U.S. EPA *Chemical Inventory*
  https://www.epa.gov/tsca-inventory
- U.S. EPA *ChemView*
  https://java.epa.gov/chemview
- TRI P2 information
  https://www.epa.gov/toxics-release-inventory-tri-program/pollution-prevention-p2-and-tri
- U.S. EPA *HPV HC* (access through Chemical Data Access Tool – CDAT)
  https://java.epa.gov/oppt_chemical_search/
- U.S. EPA *HPVIS* and *HPV HC* (access through Chemical Data Access Tool – CDAT)
  https://java.epa.gov/oppt_chemical_search/
- DfE Alternatives Assessments
  https://www.epa.gov/saferchoice/design-environment-alternatives-assessments
- Safer Chemical Ingredients List
  https://www.epa.gov/saferchoice/safer-ingredients
- Green Chemistry awards
  https://www.epa.gov/greenchemistry/presidential-green-chemistry-challenge-winners
- Greener products and services
  https://www.epa.gov/greenerproducts/identify-greener-products-and-services
- Pollution Prevention
  https://www.epa.gov/p2/pollution-prevention-case-studies
  https://www.epa.gov/p2/grant-programs-pollution-prevention#sra
  https://www.epa.gov/p2/pollution-prevention-tools-and-calculators
- U.S. EPA *InertFinder*
  https://iaspub.epa.gov/apex/pesticides/f?p=101:1:
- U.S. EPA *Pesticide Chemical Search*
  https://iaspub.epa.gov/apex/pesticides/f?p=CHEMICALSEARCH:1:0::NO:1::
- U.S. EPA *Endocrine Disruptor Screening Program*
  https://www.epa.gov/ingredients-used-pesticide-products/endocrine-disruptor-screening-program-tier-1-assessments
- U.S. EPA *Hazardous Waste*
  https://www.epa.gov/hw/learn-basics-hazardous-waste#regulations
- U.S. EPA *Superfund chemical data matrix*
  https://www.epa.gov/superfund/superfund-chemical-data-matrix-scdm-query
- U.S. EPA *Hazardous Air Pollutants*
  https://www.epa.gov/haps/initial-list-hazardous-air-pollutants-modifications
- U.S. EPA *Significant New Alternatives Policy (SNAP)*
  https://www.epa.gov/snap
- U.S. EPA *Volatile Organic Compounds*
  https://www.epa.gov/indoor-air-quality-iaq/technical-overview-volatile-organic-compounds#definition
- U.S. EPA *Toxic and priority pollutants under the Clean Water Act*

https://www.epa.gov/eg/toxic-and-priority-pollutants-under-clean-water-act#toxic

- U.S. EPA *Contaminant Candidate list under the Safe Drinking Water Act*
  https://www.epa.gov/ccl/contaminant-candidate-list-3-ccl-3#chemical-list
- U.S. EPA *IRIS Assessment*
  https://cfpub.epa.gov/ncea/iris2/atoz.cfm
- U.S. EPA *SRS*
  https://iaspub.epa.gov/sor_internet/registry/substreg/searchandretrieve/substancesearch/search.do
- U.S. EPA *Chemical and Product Categories (CPCat) Database*
  https://actor.epa.gov/cpcat/faces/home.xhtml
- U.S. National Library of Medicine *ChemIDplus*
  https://chem.sis.nlm.nih.gov/chemidplus/
- U.S. National Library of Medicine *Hazardous Substance Data Bank (HSBD)*
  https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm
- U.S. Department of Health & Human Services *Household Products Database*
  https://hpd.nlm.nih.gov/index.htm
- OSHA *Chemical Hazards and Toxic Substances*
  https://www.osha.gov/SLTC/hazardoustoxicsubstances/index.html
- NIOSH Workplace Safety and Health Topics *Chemicals*
  http://www.cdc.gov/niosh/topics/chemical.html
- NIOSH *Pocket Guide to Chemical Hazards*
  http://www.cdc.gov/niosh/npg/npgdcas.html
- CPSC *Chemicals*
  http://www.cpsc.gov/en/Research--Statistics/Chemicals/
- CPSC *FHSA*
  https://www.cpsc.gov/Business--Manufacturing/Business-Education/Business-Guidance/FHSA-Requirements/
- Food and Drug Administration *List of Databases*
  http://www.fda.gov/ForIndustry/FDABasicsforIndustry/ucm234631.htm
- NTP (National Toxicology Program) *Substances studied by NTP*
  http://ntpsearch.niehs.nih.gov/?e=True&ContentType=Testing+Status
- Department of Energy *Protective Action Criteria Database*
  http://energy.gov/ehss/protective-action-criteria-pac-aegls-erpgs-teels-rev-29-chemicals-concern-may-2016
- California Department of Toxic Substances Control *Toxics in Products*
  http://www.dtsc.ca.gov/PollutionPrevention/ToxicsInProducts/index.cfm
  http://www.dtsc.ca.gov/SCP/CandidateChemicalsList.cfm
  http://www.dtsc.ca.gov/SCP/WhatIsAPriorityProduct.cfm
- California Office of Environmental Health Hazard Assessment *Proposition 65*
  http://oehha.ca.gov/proposition-65/chemicals
  http://oehha.ca.gov/proposition-65/proposition-65-list
- California Office of Environmental Health Hazard Assessment *Biomonitoring*
  http://biomonitoring.ca.gov/chemicals

- California *permissible exposure limits for chemical contaminants*
  https://www.dir.ca.gov/title8/5155table_ac1.html
- California *hazardous substance list*
  https://www.dir.ca.gov/title8/339.html
- California *Safe Cosmetics Program – list of chemical agents known or suspected to cause cancer or developmental or other reproductive harm.*
  http://www.cdph.ca.gov/programs/cosmetics/Pages/default.aspx
  https://safecosmetics.cdph.ca.gov/search/Default.aspx
- Maine *chemicals of high concern*
  http://www.maine.gov/dep/safechem/highconcern/
- Massachusetts *Toxics Use Reduction Act (TURA) (link includes a link to Higher hazard substances list)*
  http://www.mass.gov/eea/waste-mgnt-recycling/toxics/toxic-use-reduction/toxics-use-reduction-act/
- Massachusetts *Complete list of TURA chemicals*
  http://www.mass.gov/eea/agencies/massdep/toxics/tur/toxics-use-reduction-act-tura-reporting-and-fees.html
- Lowell Center for Sustainable Production *Chemical, Policy and Science Initiative*
  http://www.chemicalspolicy.org/chemicalspolicy.us.state.database.php
- Minnesota Department of Health *Toxic Free Kids Act Chemicals of High Concern*
  http://www.health.state.mn.us/divs/eh/hazardous/topics/toxfreekids/highconcern.html
- Michigan *Environmental Health Topics*
  http://www.michigan.gov/mdhhs/0,5885,7-339-71548_54783_54784_74881-13050--,00.html
- New Hampshire *Regulated Toxic Air Pollutants*
  http://des.nh.gov/organization/commissioner/legal/rules/documents/env-a1400.pdf
- New Jersey *Right to Know Hazardous Substances*
  http://web.doh.state.nj.us/rtkhsfs/rtkhsl.aspx
- Oregon *Priority Persistent Pollutants (in water)*
  http://www.deq.state.or.us/wq/SB737/
- Oregon *Pollutant Profiles*
  http://www.deq.state.or.us/wq/SB737/docs/LegRpAtt420100601.pdf
- Oregon *Reducing Toxics in Oregon*
  http://www.oregon.gov/deq/Pages/ToxicsReduction.aspx
- Oregon *Chemicals of Concern for Children's Health*
  http://public.health.oregon.gov/HealthyEnvironments/HealthyNeighborhoods/ToxicSubstances/Pages/childrens-chemicals-of-concern.aspx
- Pennsylvania Department of Labor and Industry *Hazardous Substance List*
  http://www.pacode.com/secure/data/034/chapter323/chap323toc.html
- Rhode Island *Air Resources – Air Toxics*
  http://www.dem.ri.gov/pubs/regs/regs/air/air22_08.pdf
- Vermont *Chemical Disclosure Program for Children's Products*
  http://www.healthvermont.gov/enviro/chemical/cdp.aspx
- Washington *Chemicals of High Concern to Children*
  http://www.ecy.wa.gov/programs/hwtr/rtt/cspa/chcc.html

- Washington *Children's Safe Products Act*
  http://apps.leg.wa.gov/RCW/default.aspx?cite=70.240
- Washington Department of Labor & Industries *SHARP Publications*
  http://www.lni.wa.gov/Safety/Research/Pubs/default.asp
- National Conference of State Legislatures
  http://www.ncsl.org/research/environment-and-natural-resources/state-chemical-statutes.aspx
- Canada *Chemicals Portal*
  http://chemicalsubstanceschimiques.gc.ca/index-eng.php
- EU *ECHA website*
  https://echa.europa.eu/
- Australia *NICNAS Chemical Information*
  https://www.nicnas.gov.au/chemical-information
- Japan *Chemical Risk Information Platform (CHIRP)*
  http://www.nite.go.jp/en/chem/chrip/chrip_search/systemTop
- OECD *eChemPortal*
  http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en
- Stockholm Convention on Persistent Organic Pollutants
  http://chm.pops.int/TheConvention/ThePOPs/ListingofPOPs/tabid/2509/Default.aspx
  http://chm.pops.int/TheConvention/ThePOPs/ChemicalsProposedforListing/tabid/2510/Default.aspx
- WHO IPCS (UN)
  http://www.who.int/ipcs/en/
- Other – worker protection information
  http://www.dguv.de/ifa/gestis/gestis-internationale-grenzwerte-fuer-chemische-substanzen-limit-values-for-chemical-agents/index-2.jsp
- DeLima Associates *Consumer Product Information Database (CPID)*
  https://www.whatsinproducts.com/chemicals/index/1
- SRC *FatePointers Search Module PHYSPROP*
  http://esc.syrres.com/fatepointer/search.asp
- Product and company websites