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- Agrell, C., A. F. H. ter Schure, J. Sveder, A. Bokenstrand, P. Larsson and B. N. Zegers (2004). Polybrominated diphenyl ethers (PBDEs) at a solid waste incineration plant. I: atmospheric concentrations. *Atmos. Environ.* 38, 5139-5148.
- Alaee, M., P. Arias, A. Sjødin and Å. Bergman (2003). An overview of commercially used brominated flame retardants, their applications, their use patterns in different countries/regions and possible modes of releases. *Env. Inter.* 29, 683-689.
- Ballschmiter, K., A. Mennel and J. Buyten (1993). Long-chain Alkyl Polysiloxanes as Non-Polar Stationary Phases in Capillary Gas Chromatography, *Fresenius' J. Anal. Chem.* 346: 396-402.
- Betts, K. (2006). PBDEs and PCBs in computers, cars, and homes. *Environ. Sci. Technol.* 40: 7452.
- BSEF (2007). Annex F Questionnaire Responses Submitted by the Bromine Science and Environment Forum (BSEF).
- BSEF (2001). Major brominated flame retardants volume estimates. Total market demand by region 2001. Bromine Science and Environment Forum 21 January 2001. www.bsef.com.
- Burreau S, Zebühr Y, Broman D, Ishaq R. 2006. Biomagnification of PBDEs and PCBs in food webs from the Baltic Sea and the northern Atlantic Ocean. *Sci Total Environ.* 366:659-72.
- Cantón RF, Sanderson JT, Nijmeijer S, Bergman A, Letcher RJ, van den Berg M. 2006. In vitro effects of brominated flame retardants and metabolites on CYP17 catalytic activity: a novel mechanism of action? *Toxicol Appl Pharmacol.*
- Danish EPA (1999). Brominated flame retardants. Substance flow analysis and assessment of alternatives. www2.mst.dk/udgiv/Publications/1999/87-7909-416-3/html/kap04_eng.htm
- Daugherty, M.L. (1982). Chemical hazard information profile draft report: Melamine CAS No. 108-78-1. Office of Toxic Substances, US EPA.
- Environment Canada (2006). Regulatory Impact Analysis Statement for proposed Polybrominated Diphenyl Ether Regulations. www.ec.gc.ca/CEPA/Registry/regulations/Detail/Reg.cfm?intReg=108.
- Environmental International Reporter (2006). Electronics firms worldwide pledge to meet EU Directive banning use of some chemicals. Vol. 29, No 5.
- European Union (2000). Risk Assessment of Diphenyl Ether, Pentabromo derivative (Pentabromodiphenyl ether). CAS Number: 32534-81-9, EINECS Number: 251-084-2. Final report of August 2000, Commissioner of the European Communities. Rapporteur: United Kingdom.
- European Union (2002). Risk Assessment. Report of bis(pentabromophenyl)ether. CAS Number: 1163-19-5, EINECS Number: 214-604-9. Final report. European Chemical Bureau. Volume 17. Appendix G.
- Fjeld, E., M. Schlabach, J. A. Berge, T. Eggen, P. Snilsberg, G. Källberg, S. Rognerud, A. Borgen and H. Gundersen (2003). Screening of selected new organic contaminants - brominated flame retardants, chlorinated paraffins, bisphenol A and triclosan. SFT-report 4809/2004.
- Fjeld, E., M. Schlabach, J. A. Berge, N. Green, T. Eggen, P. Snilsberg, C. Vogelsang, S. Rognerud, G. Kjellberg, E. K. Enge, C. A. Dye and H. Gundersen (2004). Screening of selected new organic contaminants 2004. Brominated flame retardants, alkylated substances, irganol, diuron, BHT and dicofol. SFT-report 927/2005.
- Freedonia Group Inc. (2005): World flame retardants. R154-1365. <http://www.mindbranch.com>
- Hale, R. C., M.J. La Guardia, E. Harvey and T.M. Mainor (2002). Potential role of fire retardant-treated polyurethane foam as a source of brominated diphenyl ethers to the US environment. *Chemosphere* 46: 729-735.
- Hazrati, S. and S. Harrad (2006). Causes of Variability in Concentrations of Polychlorinated Biphenyls and Polybrominated Diphenyl Ethers in Indoor Air. *Environ. Sci. Technol.* 40: 7584-7589.

- Law, R.J., C. R. Allchin, J. de Boer, A. Covaci, D. Herzke, P. Lepom, S. Morris, J. Tronczynski and C. A. de Wit (2005). Levels and Trends of Brominated Flame Retardants in European and Greenland Environments. *Chemosphere* 64: 187 – 208.
- Huwe J, Hakk H, Lorentzsen M. 2007. Bioavailability and mass balance studies of a commercial pentabromodiphenyl ether mixture in male Sprague-Dawley rats. *Chemosphere*. 66:259-66.
- La Guardia, M.J., Hale R.C. and Harvey, E. (2006) Detailed Polybrominated Diphenyl Ether (PBDE) Congener Composition of the widely used Penta-, Octa- and Deca-PBDE Technical Flame-Retardant Mixtures. *Environ. Sci. Technol.* 40(20) : 6247-6254.
- Leisewitz, A., H. Kruse and E. Schramm (2000). German Federal Ministry of the Environment, Nature Conservation and Nuclear Safety, Substituting Environmentally Relevant Flame Retardants: Assessment Fundamentals. Research report 204 08 642 or 207 44 542.
- Morf, L.S., J. Tresp, R. Gloor, Y. Huber, M. Stengele and M. Zenegg (2005). Brominated flame retardants in waste electrical and electronic equipment: Substance flow in a recycling plant. *Environ. Sci. Technol.* 39, 8691-8699.
- Norwegian EPA (2003). Bruken av bromerte flammehemmere i produkter.
- Materialstrømsanalyse. (The use of brominated flame retardants in products. A material flow analysis) TA-1947/2003. (In Norwegian only).
- OECD (2001): Report on Incineration of Products Containing Brominated Flame Retardants. [http://www.oilis.oecd.org/oilis/1997doc.nsf/LinkTo/env-epoc-wmp\(97\)4-REV3](http://www.oilis.oecd.org/oilis/1997doc.nsf/LinkTo/env-epoc-wmp(97)4-REV3)
- Peltola, J. and Yla-Mononen, L. (2001). Pentabromodiphenyl ether as a global POP. *TemaNord* 2001, vol. 579. Copenhagen: Nordic Council of Ministres; ISBN 92-893-0690-4: 78 pp.
- Prevedouros, K., K. C. Jones and A. J. Sweetman (2004). Estimation of the production, consumption, and atmospheric emissions of pentabrominated diphenyl ether in Europe between 1970 and 2000. *Environ. Sci. Technol.* 38, 3224-3231.
- Prevedouros, K., Jones, K.C., and Sweetman, A.J. (2004). Estimation of the Production, Consumption and Atmospheric Emissions of Pentabrominated Diphenyl Ethers in Europe Between 1970 and 2000. *Environ. Sci. Technol.* 38: 3224-3231.
- RPA (2000). Risk Reduction Strategy and Analysis of Advantages and Drawbacks for Pentabromodiphenyl Ether. Stage 4 Report. Risk & Policy Analysis Limited, London.
- SAICM Overarching Policy Strategy 14d, Global Plan of Action Activity 54, 55 (2002). www.chem.unep.ch/saicm%20texts/SAICM%20documents.htm.
- Shoeb, M., Harner, T., Ikononou, M. and Kannan, K. (2004). Indoor and Outdoor Concentrations and Phase Partitioning of Perfluoroalkyl Sulfonamides and Polybrominated Diphenyl Ethers. *Environ. Sci. Technol.* 38: 1313-1320.
- Stapleton, H.M., Dodder, N.G., Offenberg, J.H., Schantz, M.M. and Wise, S.A. 2005. Polybrominated Diphenyl Ethers in House Dust and Clothes Dryer Lint. *Environ. Sci. Technol.* 39: 925-931.
- Swiss Agency (2002). Environmentally hazardous substances: Selected polybrominated flame retardants, PBDE and TBBPA – Substance flow analysis. Environmental series No. 338.
- ter Schure, A.F.H., C. Agrell, A. Bokenstrand, J. Sveder, P. Larsson and B. N. Zegers (2004). Polybrominated diphenyl ethers at a solid waste incineration plant II: atmospheric deposition. *Atmos. Environ.* 38, 5149-5155.
- TNO (2005). Study of the effectiveness of the UNECE Persistent organic pollutants protocol and cost of possible additional measures. Phase I: Estimation of emission reduction resulting from the implementation of the POP protocol. R 2005/194.
- UNEP (2006). Risk profile: pentabromodiphenyl ether. Stockholm Convention on Persistent Organic Pollutants. Persistent Organic Pollutants Review Committee, Second Meeting, Geneva 6-10 November, 2006. UNEP/POPS/POPRC.2/17, Addendum 1.

US EPA (2005). Future Flame Retardant Partnership: Environment Profiles of Chemical Flame-retardant Alternatives for Low Density Polyurethane Foam. Chemical Hazard Reviews, Vols. 1&2. www.epa.gov/dfe/pubs/flameret/ffr-alt.htm.

Van der Goon, D., M. van het Bolscher, A.J.H. Visschedijk and P.Y.J. Zandveld (2005). Study of the effectiveness of the UNECE persistent organic pollutants protocol and cost of possible additional measures. Phase I: Estimation of emission reduction resulting from the implementation of the POP protocol. TNO-report 2005/194.

Washington State (2006). Polybrominated Diphenyl Ether (PBDE) Chemical Action Plan: Draft Final Plan, December 1, 2005.

Wilford, B.H., M. Shoeib, T. Harner, J. Zhu and Jones, K.C. (2005). Polybrominated Diphenyl Ethers in Indoor Dust in Ottawa, Canada: Implications for Sources and Exposure. Environ. Sci. Technol. 39(18): 7027-7035.
