2016 Children's Safe Products - Reporting Rule update
Draft Chemical Evaluation

CAS 26040-51-7

Substance Name Bis (2-ethylhexyl) 2,3,4,5-tetrabromophthalate (**TBPH**, also BEH-TEBP)

Toxicity

EPA classified Bis (2-ethylhexyl) 2,3,4,5-tetrabromophthalate (TBPH) as a moderate hazard for reproductive, developmental, neurological and repeated dose toxicities based on rodent toxicity of commercial mixtures, structurally similar chemicals, and professional judgement [1]. Significant data gaps were noted. Lowest-observed-adverse-effect-levels (LOAELs) for developmental effects in rats were 100 mg/kg-day in an oral prenatal study of a commercial mixture of TBB and TBPH. A LOAEL of 1 mg/kg-day was reported in a second perinatal oral study with another commercial mixture, Firemaster® 550, which contains TBB[1] and TBPH plus two non-brominated phosphate flame retardants [1]. The latter study, published by Patisaul et al. 2013, found that pregnant rats exposed to the Firemaster® 550 mixture during gestation and lactation had altered thyroid function and produced offspring that were 30–60% heavier by weaning, an effect that persisted into adulthood. Female offspring of treated rats entered puberty sooner and had glucose intolerance and elevated anxiety behaviors in maze testing [2].

TBPH is a brominated analog of phthalate DEHP[1] and may be an endocrine disrupter [3]. A metabolite of TBPH induced proliferative damage in rodent liver and altered serum thyroid hormone (T3) in rats after 2 days exposure to 200 mg/kg per day [3]. A study in Boston, Massachusetts reported house dust concentrations of TBPH were positively associated with higher level of thyroid hormone (T3) in men [4].

Exposure

TBPH has been detected in foam baby products [5] and U.S. residential furniture [6]. TBPH is an ingredient in additive flame retardant mixtures used in flexible polyurethane foam. TBPH is also used in construction materials and as a non-flammable plasticizer in PVC electrical equipment and electronics and appliances. In addition, TBPH is a flame retardant in neoprene and certain rubbers [7].

TBPH has been measured with high frequency in residential indoor dust in the United States [3, 4, 8-10] and Canada [11, 12]. It was found in 100% of indoor dust samples from childcare centers studied in 2010-2011 in Northern California [13]. Across all these studies, mean levels in indoor dust ranged from 144-734 ng/g dust and the maximum level reported was 47,110 ng/g. In a study of pregnant women in North Carolina, levels of TBPH in dust were correlated positively with levels in hand wipes [14]. TBPH was also detected in 100% of office dust and 90% of car dust in Boston study [3].

TBPH was detected in human serum in a 2014 Indiana study of adults aged 19-38 [15] and in maternal serum and breast milk collected in a 2008-2009 study of women living in Québec Canada [16].

TBPH is classified by EPA as high hazard for persistence, and bioaccumulation [1].

[1] TBB – 2-ethylhexyl-2,3,4,5-tetrabromobenzoate; DEHP – di(2-ethylhexyl) phthalate

References

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