

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

CAS 78-33-1 and 220352-35-2

Substance name Tris (p-tert-butylphenyl) phosphate (**TBPP**)

Toxicity

Tris (p-tert-butylphenyl) phosphate (TBPP) is structurally very similar to IPTPP, TCP, and TPP flame retardants¹. EPA classified TBPP as a moderate hazard for reproductive and neurological toxicity and a high hazard for toxicity from repeated dosing [1]. These classifications have significant uncertainty as little data were available on this specific chemical. Instead, EPA relied on toxicity data from structurally similar compounds and from various mixtures of butylated triphenyl phosphates. A National Toxicology Program (NTP) rat study of oral dosing with a TBPP mixture (CAS 220352-35-2) produced abnormal reproductive cycles, decreased fertility, decreased uterine weights, and increased adrenal and liver weights at doses of 1,000 and 1,700 mg/kg-d [2]. Depression of plasma and brain cholinesterase (an essential neurological enzyme) was observed in rabbits following a three-week dermal exposure to TBPP (the lowest-observed-adverse-effect-level (LOAEL) was 100 mg/kg-d). A 90-day inhalation study in rats with a commercial mixture that contained TBPP and other similar chemicals, resulted in clinical signs of toxicity (mostly respiratory symptoms) and increased liver weights relative to body weight. The LOAEL of this study was 100 mg/m³. It is possible that dermal and inhalation routes of exposure are more toxic than the oral route [1].

TBPP is listed in the Annex III of REACH² because EU structure-activity models suggest concerns for persistence, bioaccumulation, aquatic toxicity, and reproductive and developmental toxicity.

Exposure:

Butylated triphenyl phosphates mixtures are used as flame retardants in flexible polyurethane foam, plastics, and have potential for use in treated upholstery fabrics [2, 3]. TBPP was listed as a potential alternative to PBDE³ flame retardants in polyurethane foam [1]. TBPP is used in commercial lubricants and hydraulic fluids [2] and is listed as an indirect food additive for use in adhesives in food packaging [4]. U.S. national production volume for CAS No 78-33-1 and 220352-35-2 were reported to be 708,919 and 9, 118,198 pounds/year, respectively [5].

Butylated triphenyl phosphates were identified in polyurethane foam of 13% of 102 U.S. residential couches purchased after 2004 suggesting that it is a newer replacement for PBDEs in foam [6]. Polybutylated aryl phosphates were also detected in combination with TPP in a foam baby product [7] and in child mattresses and other household furniture [8].

We did not locate any biomonitoring and house dust studies which measured TBPP. In assessing the commercial mixture butylated triphenyl phosphate (CAS 220352-35-2), EPA concluded that there is a

¹ IPTPP – Isopropylated triphenyl phosphate; TCP – Tricresyl phosphate; TPP – Triphenyl phosphate

² REACH – Registration, Evaluation and Authorisation and Restriction of Chemicals

³ PBDE – polybrominated diphenyl ether

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high potential for consumers to be exposed and that exposures to children might be expected to occur through the household use of consumer products [2].

EPA considered TBPP to have high potential for bioaccumulation and moderate persistence in the environment. [1]

References

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4. HSDB. *Tris(p-t-butylphenyl) phosphate, (CASRN: 78-33-1)*. 2003 Updated 02/14/2003 [accessed 12/10/2015]; Available from: <http://toxnet.nlm.nih.gov/cgi-bin/sis/search2>.
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8. Cooper, E.M., et al., *Results from Screening Polyurethane Foam Based Consumer Products for Flame Retardant Chemicals: Assessing Impacts on the Change in the Furniture Flammability Standards*. *Environ Sci Technol*, 2016.