

Batch #1 of Toxicological Studies of the aryl phosphate esters - focus on triphenyl phosphate (TPP or TPhP)						
Substance	Year	Author	Endpoint	Title	Concentration	Test substance
TPP, EHDP, IDPP, DPHP	2024	<a href="#">Jin et al.</a>	Intestinal tract, liver, heart, other organs,	Ecological and human health risk of aryl-phosphate flame retardants (APFRs): Sources, distribution, and toxicity.		
TPP	2024 (a)	<a href="#">Zhang et al.</a>	DNT	Astaxanthin activates the Nrf2/Keap1/HO-1 pathway to inhibit oxidative stress and ferroptosis, reducing triphenyl phosphate (TPHP)-induced neurodevelopmental toxicity		zebrafish
TPP	2024	<a href="#">Schmandt</a>	DT	Environmentally Relevant Concentrations of Triphenyl Phosphate (TPP or TPhP) Impact Development in Zebrafish	1.5–15 nM (0.5 µg/L–5 µg/L)	zebrafish larvae
TPP, IPP, EHDP, TMPP, IDDP, BDP	2024	<a href="#">Kreutz et al.</a>	DNT and NT	Integrated Approach for Testing and Assessment form Developmental Neurotoxicity (DNT) to Prioritize Aromatic Organophosphorus Flame Retardants		22 NAMs for DNT or NT
TPP	2023	<a href="#">Hawkey et al.</a>	DNT	Developmental exposure to the flame retardant, triphenyl phosphate, causes long-lasting neurobehavioral and neurochemical dysfunction	16 or 32 mg/kg/day	Sprague Dawley rats
TPP, ITPs	2023	<a href="#">Newell et al.</a>	DT	Developmental organophosphate flame retardant exposure disrupts adult hippocampal neurogenesis in Wistar rats	3.3 mg/kg bw/day	Wistar rats dams
TPP, ITPs	2023	<a href="#">Witchey et al.</a>	DT	Reproductive and developmental toxicity following exposure to organophosphate ester flame retardants and plasticizers, triphenyl phosphate and isopropylated phenyl phosphate, in Sprague Dawley rats	TPHP or IPP were administered via dosed feed at concentrations 0, 1000, 3000, 10 000, 15 000, or 30 000 ppm to time-mated Hsd:Sprague Dawley SD rats from gestation day (GD) 6 through postnatal day (PND) 28; offspring were provided dosed feed at the same concentration as their dam	Sprague Dawley rats
TPP, ITPs	2022	<a href="#">Witchey et al.</a>	DNT	Impacts of Gestational FireMaster 550 Exposure on the Neonatal Cortex: Are Sex Specific and Largely Attributable to the Organophosphate Esters	1000 µg/day, or 3.3 mg/kg bw/day orally beginning 72 hours after pairing and continuing to PND1	Wistar rats and dams
TPP, EHDP, TCP, ITPs	2022	<a href="#">Hu et al.</a>	ED	Endocrine disrupting toxicity of aryl organophosphate esters and mode of action		
TPP, EHDP, TCrP and DPP	2022	<a href="#">Gao et al.</a>	Repro and ED	Exposure assessment of aryl-organophosphate esters based on specific urinary biomarkers and their associations with reproductive hormone homeostasis disruption in women of childbearing age		urine samples from 913 women of childbearing age
TPP	2024	<a href="#">ECHA</a>	ED	Support Document for Identification of TPP as an SVHC for ED (environment)	Summary of studies	
EHDP, TPP, IDOPP, ITP, TCP, BDP (also non-APE's: BDE-47, 99, TBBPA, tBOEP, bBoep,	2022	<a href="#">Klose et al.</a>	DNT	Neurodevelopmental toxicity assessment of flame retardants using a human DNT in vitro testing battery	Potency according to the respective most sensitive benchmark concentration (BMC) across the battery ranked from <1 µM (5 FRs), 1-10 µM (7 FRs) to the >10 µM range (3 FRs)	human cell-based DNT in vitro battery

Collected and summarized by the Massachusetts Toxics Use Reduction Institute, November 2024