Justification for the selection of a substance for CoRAP inclusion

Substance Name (Public Name):	tris(2-chloro-1-methylethyl) phosphate
Chemical Group:	
EC Number:	237-158-7
CAS Number:	13674-84-5
Submitted by:	Danish Environmental Protection Agency
Date:	17/03/2015

Note

This document has been prepared by the evaluating Member State given in the CoRAP update.

Contents

1 IDENTITY OF THE SUBSTANCE

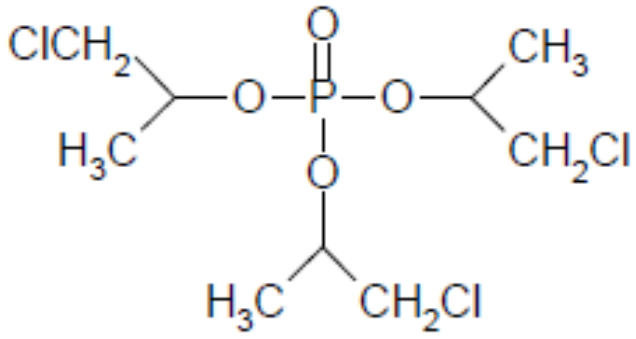
1.1 Other identifiers of the substance

Table 1: Substance identity

EC name:	tris(2-chloro-1-methylethyl) phosphate
IUPAC name:	tris(2-chloro-1-methylethyl) phosphate
Index number in Annex VI of the CLP Regulation	
Molecular formula:	$C_9H_{18}C_{l3}O_4P$
Molecular weight or molecular weight range:	327.57
Synonyms/Trade names:	2-Propanol, 1-chloro, phosphate (3:1) Tris(monochloroisopropyl) phosphate (TMCP) Tris(2-chloroisopropyl) phosphate (TCIP) Phosphoric acid, tris(2-chloro-1-methylethyl) ester 1-Chloro-2-propanol phosphate (3:1) TCPP

Type of substance ☐ Mono-constituent ☒ Multi-constituent ☐ UVCB

Structural formula:



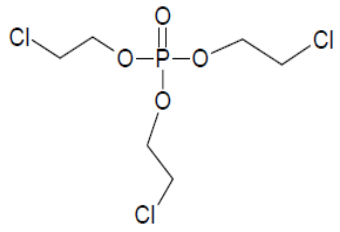
Above is the structural formula of the main component Tris(2-chloro-1-methylethyl) phosphate. The substance is regarded as a multi-constituent substance consisting of tris(2-chloro-1-methylethyl) phosphate (main component), bis(2-chloropropyl)-1-chloro-2-propyl phosphate, bis(1-chloro-2-propyl)-2-chloropropyl phosphate and tris(2-chloropropyl) phosphate.

It can be seen from the structural formula of the substance that tris(2-chloro-1-methylethyl) phosphate has chiral centres. Therefore the substance is regarded as a mixture of stereoisomers.

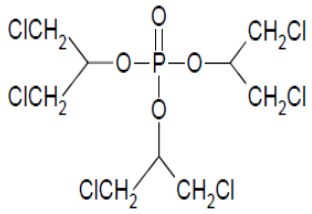
1.2 Similar substances/grouping possibilities

Structural formula:

Tris(2-chloroethyl) phosphate (TCEP)



Tris[2-chloro-1-(chloromethyl)ethyl] phosphate (TDCP)



2 CLASSIFICATION AND LABELLING

2.1 Harmonised Classification in Annex VI of the CLP

There is no harmonised classification available for TCPP.

2.2 Self classification

- In the registration

  Acute Tox. 4 H302: Harmful if swallowed

- The following hazard classes are notified among the aggregated self-classifications in the C&L Inventory:

International chemical identification	CAS No	Classification	
		Hazard Class and Category Code(s)	Hazard statement Code(s)
Tris(2-chloro-1-methylethyl)-phosphate	13674-84-5	Acute Tox. 4 Eye Irrit. 2 Skin Irrit. 2	H302 H319 H315
		Aquatic Chronic 3	H412

In the notified classifications to ECHA, 32 out of 596 notifiers have classified the substance as Aquatic Chronic 3; H412.

2.3 Proposal for Harmonised Classification in Annex VI of the CLP

None

3 INFORMATION ON AGGREGATED TONNAGE AND USES

From ECHA dissemination site		
☐ 1 – 10 tpa	☐ 10 – 100 tpa	☐ 100 – 1000 tpa
☐ 1000 – 10,000 tpa	☒ 10,000 – 100,000 tpa	☐ 100,000 – 1,000,000 tpa
☐ 1,000,000 – 10,000,000 tpa	☐ 10,000,000 – 100,000,000 tpa	☐ > 100,000,000 tpa
☐ <1 . . . . . >+ tpa (e.g. 10+ ; 100+ ; 10,000+ tpa)		☐ Confidential

Two individual registrations in the 1000-10,000 Tpa band and 10,000-100,000 Tpa band, respectively.

☒ Industrial use	☒ Professional use	☒ Consumer use	☐ Closed System

TCPP is an additive flame retardant, i.e. it is physically mixed with the material being treated rather than chemically bound (ECHA, 2008). Over 40,000 tonnes of TCPP were used in the EU in the year 2000, and most of this (> 98%) was used as flame retardant in the production of polyurethane (PUR) for the use in construction (e.g. insulation/ fillers) and furniture (ECHA, 2008).

Most TCPP is used in rigid PUR foam (over 80%) mainly for construction applications. The remaining PUR applications are accounted for by flexible foam for automotive applications However, TCPP has been found in indoor air in cars.

Three consumer exposure scenarios from which exposure to TCPP could occur include TCPP-containing flexible PUR foam in furniture; the use of one-component foams; and use of rigid insulation foams and levels in indoor air.

4 OTHER COMPLETED/ONGOING REGULATORY PROCESSES THAT MAY AFFECT SUITABILITY FOR SUBSTANCE EVALUATION

☐ Compliance check, Final decision	☐ Dangerous substances Directive 67/548/EEC
☐ Testing proposal	☒ Existing Substances Regulation 793/93/EEC
☐ Annex VI (CLP)	☐ Plant Protection Products Regulation 91/414/EEC
☐ Annex XV (SVHC)	☐ Biocidal Products Directive 98/8/EEC ; Biocidal Product Regulation (Regulation (EU) 528/2012)
☐ Annex XIV (Authorisation)	☒ Other (provide further details below)
☐ Annex XVII (Restriction)	

A draft update of the EU Toys Directive 2009/48/EC proposes to introduce a specific content limit value of 5 mg/kg (ppm) for tris(2-chloroethyl)phosphate (TCEP), tris(2-chloro-1-methylethyl) phosphate (TCPP), and tris[2-chloro-1-(chloromethyl)ethyl] phosphate (TDCP) in toys.

A European Risk Assessment report (under ESR) was published in 2008.

5 JUSTIFICATION FOR THE SELECTION OF THE CANDIDATE CoRAP SUBSTANCE

5.1 Legal basis for the proposal

☒ Article 44(2) (refined prioritisation criteria for substance evaluation)

☐ Article 45(5) (Member State priority)

5.2 Selection criteria met (why the substance qualifies for being in CoRAP)

☒ Fulfils criteria as CMR/ Suspected CMR

☐ Fulfils criteria as Sensitiser/ Suspected sensitiser

☒ Fulfils criteria as potential endocrine disrupter

☒ Fulfils criteria as PBT/vPvB / Suspected PBT/vPvB

☒ Fulfils criteria high (aggregated) tonnage (*tpa > 1000*)

☒ Fulfils exposure criteria

☐ Fulfils MS's (national) priorities

5.3 Initial grounds for concern to be clarified under Substance Evaluation

Hazard based concerns		
CMR ☐C ☐M ☐R	Suspected CMR[1] ☒ C ☐M ☒R	☒ Potential endocrine disruptor
☐ Sensitiser	☐ Suspected Sensitiser[1]	
☐ PBT/vPvB	☒ Suspected PBT/vPvB[1]	☐ Other (please specify below)
Exposure/risk based concerns		
☒ Wide dispersive use	☒ Consumer use	☐ Exposure of sensitive populations
☒ Exposure of environment	☐ Exposure of workers	☒ Cumulative exposure
☐ High RCR	☒ High (aggregated) tonnage	☐ Other (please specify below)

Human hazard

No carcinogenicity studies are available. However, the EU-RAR considered that there was sufficient information from the structures, physical chemical properties, toxicokinetics and mutagenic profiles of TCEP, TDCP (TCEP and TDCP are both classified as Carc 2 H351) and TCPP to support a qualitative read-across to address the hazard and risk assessment for the carcinogenicity endpoint for TCPP. It was accepted that there were some differences in the metabolism, the target organs and the severity of the effects observed with the three substances. Also, there was no insight into an underlying mode of action for TCEP and TDCP which would make a prediction on relatively potency of TCPP possible. Therefore, the EU-RAR concluded that a quantitative read-across approach was not considered sufficiently robust for the purpose of classification and labelling.

[1] CMR/Sensitiser: known carcinogenic and/or mutagenic and/or reprotoxic properties/known sensitising properties (according to CLP harmonized or registrant self-classification or CLP Inventory)
Suspected CMR/Suspected sensitiser: suspected carcinogenic and/or mutagenic and/or reprotoxic properties/suspected sensitising properties (not classified according to CLP harmonized or registrant self-classification)
Suspected PBT: Potentially Persistent, Bioaccumulative and Toxic

The above approach can be considered to be precautionary, in order to complete a risk characterization for this endpoint and was preferred to a situation in which a data gap would trigger the need for a cancer bioassay. However, as the mechanism of tumor formation in either TDCP or TCEP is not understood, and given that the effects seen in the repeated dose toxicity study with TCPP were slight, it was considered that there is not sufficient evidence to classify TCPP for carcinogenicity and therefore no classification for this endpoint was proposed (EU Risk Assessment Committee). Also, it should be noted that since a quantitative read-across was not supported, the starting point for the risk characterisation for carcinogenicity presented in the EU-RAR was the LOAEL derived from the 90-day dietary study for TCPP (LOAEL of 52 mg/kg based on increased liver weights) and not a dose descriptor from either TDCP or TCEP studies.

As the EU-RAR concluded that a quantitative read-across approach was not considered sufficiently robust for the purpose of classification and labelling, further action needs to be considered.

From a 2-generation reproductive toxicity study in rats a LOAEL of 99 mg/kg bw is derived for effects on fertility, based on effects on the uterus weight seen in all dosed females in the F0 generation. A LOAEL of 99 mg/kg bw is derived for developmental toxicity based on the increased number of runts observed in all dose groups of F0 generation, and a decrease in the mean number of pups delivered was observed in the mid dose group of F1 and the high dose groups of both generations. Based on the above, it is possible that TCPP has an effect on developing pups. A possible classification of TCPP would be a classification as toxic to reproduction.

The endocrine disruption potential of TCPP was investigated in an *in vitro* study with the H295R cell line where testosterone concentration was increased at 1, 10 and 100 mg/L. Furthermore, data from the 2-generation reproductive toxicity study (described above) indicate hormonal disturbance by TCPP due to the findings concerning decreased uterus weight and also prolongation of the oestrus cycle. The results indicate that TCPP could alter the sex hormone balance. This could support a classification as indicated above. However, it remains to be determined whether increased testosterone level also occurs *in vivo* and whether this could be associated to the decrease in uterus weight. Thus, further verification/studies would be needed to clarify the potential for endocrine disruption of the substance.

Environmental hazard

TCPP is not readily biodegradable according to OECD Guideline no 301. TCPP is expected to have a half-life of at least one year under environmental conditions, based on a standard preliminary hydrolysis test.

While standardized lab-tests indicate a low potential for bioaccumulation, monitoring data shows that the substance can be found in animals far from emission sources, including in white-tailed eagles, common eiders, great-black backed gulls, harbor seals and polar bears. The discrepancy between standardized tests for bioaccumulation and field observations leaves room for doubt about the validity of the measured BCFs. The field measurements indicate a need for reevaluation of the bioaccumulation potential for TCPP, and also the environmental risk assessment. The measurements also highlight the possibility that there may be some other mechanism involved in bioaccumulation, other than lipophilicity.

TCPP has also been detected in WWTP sludge and effluents in Norway, and a recent study of EU WWTP-effluents demonstrated that TCPP is commonly found in wastewater effluents. These results indicate that TCPP may partition into several environmental compartments and potentially contaminate both sewage sludge and recipient waters. Eggen et al. have recently demonstrated that TCPP, along with TCEP, can accumulate in tissues of important food crops, such as wheat, barley, and carrot. Current practices for land-application of sewage sludge may therefore potentially lead to accumulation of TCPP in plants and subsequent transfer to animals and humans through food.

In the notified classifications to ECHA, 32 out of 596 notifiers have classified the substance as Aquatic Chronic 3; H412. This seems to be a proper classification of the substance since the lowest L(E)C_{50} values reported for fish and algae are 51 mg/L and 82 mg/L, respectively (i.e. > 10 to ≤100 mg/L) and TCPP is not readily biodegradable and can therefore be classified as Aquatic Chronic 3 classification (Regulation (EC) No 1272/2008 of the Council of 16 December 2008).

With respect to PBT evaluation, TCPP can be considered to meet the screening criterion as persistent (P) or potentially very persistent (vP) based on its ultimate mineralization. The available information on bioaccumulation (measured BCF (fish) of 0.8-4.6) may indicate that TCPP does not meet the bioaccumulation (B) criteria. In case the substance based on new information can be concluded to fulfil the B criterion further studies may be needed in order to conclude whether TCPP fulfils the criteria for toxicity (Teco or Tmammals).

5.4 Preliminary indication of information that may need to be requested to clarify the concern

☒ Information on toxicological properties	☐ Information on physico-chemical properties
☐ Information on fate and behaviour	☒ Information on exposure
☒ Information on ecotoxicological properties	☐ Information on uses
☒ Information ED potential	☐ Other (provide further details below)

It is stated in the EU RAR: Three consumer exposure scenarios from which exposure to TCPP could occur include TCPP-containing flexible PUR foam in furniture; use of one-component foams; and use of rigid insulation foams and levels in indoor air. Furthermore, TCPP has been found in indoor air in cars.

Moulded foam is predominantly used in the automotive industry (seat cushions, headrests), and less frequent in office furniture (EU-RAR, 2008). The majority of external panels used on modern commercial and industrial buildings use rigid PUR.

Chemical product categories disseminated for the substance:

PC 1: Adhesives, sealants
PC 9a: Coatings and paints, thinners, paint removes
PC 21: Laboratory chemicals
PC 23: Leather tanning, dye, finishing, impregnation and care products
PC 32: Polymer preparations and compounds

It seems likely that the use of TCPP may be characterised as "widespread" to "wide dispersive".

5.5 Potential follow-up and link to risk management

☒ Harmonised C&L	☒ Restriction	☒ Authorisation	X Other (provide further details)

Depending on the outcome of the substance evaluation and a subsequent RMO analysis, it might be relevant to put forward a proposal for harmonized classification, restriction or inclusion in the candidate list.