예시 1

국가·국제기구 평가보고서를 통한 시험항목의 자료제출 생략사유 및 증명자료

대상물질 : Tris(1,3-dichloro-2-propyl) phosphate (CAS No. 13674-87-8)
시험항목 : 생물농축성

등록제출자료 생략의 사유

(출처명) 본 생략사유 및 증명자료는 유럽연합 위해성 평가보고서(EU RAR: European Union Risk Assessment Report, 2008) 결과를 참고하였습니다.
(주요 종말점 및 결과값과 주요영향) Tris(1,3-dichloro-2-propyl) phosphate(CAS No. 13674-87-8)의 생물농축성에 대한 BCF 값은 31~59(유수식 30일, killifish), 50~89(지수식 30일, killifish)로 기술되어 있습니다.
(생략 시험항목) 해당결과를 통해 생물축적 잠재력과 UN GHS 및 「화학물질의 분류 및 표시 등에 관한 규정」(국립환경과학원고시)의 생물축적성 분류의 범위(BCF < 500)에 해당하는 유해성을 판단할 수 있으므로 화학물질의 등록 및 평가 등에 관한 법률 시행령 제13조 제6호의2에 따라 Tris(CAS No. 1,3-dichloro-2-propyl) phosphate(CAS No. 13674-87-8)의 생물농축성 자료를 생략하고자 합니다.

증명자료

생략사유의 증명자료로 아래와 같이 해당 자료의 국문요약을 참고로 제시합니다.

<표> 생물농축성 시험결과(요약)

출처: European Union Risk Assessment Report [May 2008], 41~42쪽

No.	자료개요 및 시험방법	시험결과
1	- **자료의 성격:** 주요자료, 요약서 - **신뢰도2:** 신뢰도 2 (valid with restrictions) - **근거(인용):** 유럽연합 위해성 평가보고서(EU RAR) 생물농축성 자료 - **시험방법:** 국가·국제기구 등의 시험지침 기술되지 않음 - **노출방법:** 30일 지수식/유수식 시험 - **GLP 준수여부:** 알 수 없음 - **시험물질 정보:** Tris(1,3-dichloro-2-propyl) phosphate(순도 미기재) - **시험종 정보:** 송사리 (killifish) - **시험용량:** 기술되지 않음	- **종말점 및 결과값:** • BCF = 31~59(유수식) • BCF = 50~89(지수식)

본 자료는 "화학물질등록평가법 시행령 제13조 및 같은법 시행규칙 제5조"에 따라 제출이 필요한 생략사유 및 증명자료의 예시로 추가검토·보완을 통해 수정·변경될 수 있으며 단순 참고자료로 활용하시기 바랍니다.

No.	자료개요 및 시험방법	시험결과
2	- **자료의 성격**: 보조자료, 요약서 - **신뢰도(결과도출방법 등)**: 신뢰도 3 (invalid) - **근거(인용)**: 유럽연합 위해성 평가보고서(EU RAR) 생물농축성 자료로 인용 - **시험방법**: 국가·국제기구 등의 시험지침 기술되지 않음 - **노출방법**: 96시간 시험 - **GLP 준수여부**: 알 수 없음 - **시험물질 정보**: Tris(1,3-dichloro-2-propyl) phosphate(순도 미기재) - **시험종 정보**: 금붕어 (Carassius auratus), 송사리 (Oryzias latipes) - **시험용량**: 1 mg/L	- **종말점 및 결과값**: • BCF = 3~5(Carassius auratus) • BCF = 77~113(Oryzias latipes)

[별첨(원문 페이지 발췌)]

시험결과 표(또는 내용)

Year test completed	Protocol cited	Results	Reliability	Study reference
1992	MITI (OECD 305C)	42d BCF 0.3 – 22 at two concentrations over 6 weeks	(4) not assignable. Only a brief summary available.	CITI, 1992
1981		96h BCF 3-5 for goldfish, 77-113 for killifish	(3) invalid	Sasaki *et al*, 1981
1982		BCF 31-59 (continuous flow through system), 50-89 (static system)	(2) valid with restrictions. Acceptable though not clearly reported	Sasaki *et al*, 1982

Bioaccumulation in fish has been assessed (CITI, 1992). The fish species used for this test was the carp (*Cyprinus carpio*). Test concentrations appear to be acceptable, being approximately 2 and 0.2% (20 and 2 µg/l) of LC_{50}, though LC_{50} values relate to other species.

Fish were kept in flow-through conditions for 28 days prior to exposure to test substance. The exposure period was 6-8 weeks following which the concentration in fish was determined (method not stated). BCFs of 0.3 – 3.3 and <2.2 – 22 were obtained for the two concentrations respectively. Bioconcentration is calculated as (concentration in fish)/(concentration in water).

TDCP and three other phosphates were investigated (Sasaki *et al,* 1981) in studies to estimate the log K_{ow}, acute toxicity to and bioconcentration in two species of fish, goldfish (*Carassius auratus*) and killifish (*Oryzias latipes*). .

The bioconcentration test was only 96 h long (the usual term of exposure is more than one week). Test fish were not fed or test vessels aerated in this time. The test system appears to be that used for the toxicity test (see section 3.3.1). The test concentration of 1 mg/l is unacceptably close to the LC_{50} reported in other sources (though this toxicity level was not observed in the species concerned). Estimated BCF is 3-5 for goldfish, 77-113 for killifish. Bioconcentration is here calculated as (concentration in fish)/(concentration in water).

The estimation of acute toxicity is very unusual and the results should not be considered further as it appears that only one test concentration was used for each test substance, the LC_{50} being estimated based on the number of survivals after 96 hours. Fish exposed to TDCP suffered a "characteristic manifestation of [organophosphorus] toxicity" – deformation of the spine. The estimated LC_{50} is 3.6 ppm in killifish, 5.1 ppm in goldfish.

A study of phosphate ester behaviour in killifish (Sasaki *et al*, 1982) discusses bioconcentration in this species of various substances using both static and flow-through systems. A 30-day exposure period was used. Bioconcentration ratios of 31-59 for TDCP were recorded for the continuous flow system; the paper quotes a previous static study in which BCFs of 50-89 were obtained; this has not been reviewed. A biological half-life of 1.65 hr was reported. Bioconcentration is calculated as (concentration in fish)/(concentration in water).

The short half-life is consistent with the rapid elimination seen in metabolic studies in the rat. Full details will be given in section 4.1.2.1.

The TGD gives a method for estimating the value of BCF in fish based on log K_{ow}. The appropriate equation is the linear equation for substances with log K_{ow} <6:

$$\text{Log } BCF_{fish} = 0.85 \log K_{ow} - 0.70$$

The log K_{ow} for TDCP is 3.69± 0.36. On the basis of the uncertainty on this value, a range of log BCF can be estimated. From the above equation, BCF_{fish} = 273.2 (range 135.1 – 552.7). The measured BCFs for TCPP and TDCP are relatively low in comparison with the predictions and with other substances of similar log K_{ow} values. There could be various causes for such a result, including the observed rapid metabolism in the organism. There is evidence for metabolism of both TDCP (which is discussed in Section 4.1.2.1) and TCPP (refer to HSA/EA, 2008a). TCEP has a similarly low measured BCF value and metabolism occurred in both *in vivo* toxicokinetics and *in vitro* studies.

The measured BCF of 45 l/kg is used in the risk assessment; this is the arithmetic mean of the range 31 to 59 l/kg. Since the values are in a narrow range, a mean is considered acceptable and representative.