

## **Biocidal Products Committee (BPC)**

Opinion on the application for approval of the active substance:

**Trihydrogen pentapotassium di(peroxomonosulfate) di(sulfate)**

**or**

**KMPS**

**Product type: 2**

ECHA/BPC/377/2023

Adopted

6 June 2023



## Opinion of the Biocidal Products Committee

### on the application for approval of the active substance trihydrogen pentapotassium di(peroxomonosulfate) di(sulfate) or KMPS for product type 2

In accordance with Article 89(1) of Regulation (EU) No 528/2012 of the European Parliament and of the Council 22 May 2012 concerning the making available on the market and use of biocidal products (BPR), the Biocidal Products Committee (BPC) has adopted this opinion on the approval in product type 2 of the following active substance:

<b>Common name:</b>	<b>Trihydrogen pentapotassium di(peroxomonosulfate) di(sulfate)</b>
<b>Chemical name:</b>	<b>Pentapotassium bis((hydroperoxysulfonyl)oxidanide) hydrogen sulfate sulfate</b>
<b>EC No.:</b>	<b>274-778-7</b>
<b>CAS No.:</b>	<b>70693-62-8</b>
<b>Existing active substance</b>	

This document presents the opinion adopted by the BPC, having regard to the conclusions of the evaluating Competent Authority. The assessment report, as a supporting document to the opinion, contains the detailed grounds for the opinion.

### Process for the adoption of the BPC opinion

Following the submission of an application by KMPS Registration Group on 31 July 2007, the evaluating Competent Authority Slovenia submitted an assessment report and the conclusions of its evaluation to the ECHA on 23 September 2022. In order to review the assessment report and the conclusions of the evaluating Competent Authority, the Agency organised consultations via BPC (BPC-47) and its Working Groups (WG-I-2023). Revisions agreed upon were presented and the assessment report and the conclusions were amended accordingly.

## Adoption of the BPC opinion

### Rapporteur: Slovenia

The BPC opinion on the application for approval of the active substance trihydrogen pentapotassium di(peroxomonosulfate) di(sulfate) in product type 2 was adopted on 6 June 2023.

The BPC opinion was adopted by consensus.

The opinion is published on the ECHA webpage at:  
<http://echa.europa.eu/regulations/biocidal-products-regulation/approval-of-active-substances/bpc-opinions-on-active-substance-approval>.

## Detailed BPC opinion and background

### 1. Overall conclusion

The overall conclusion of the BPC is that the trihydrogen pentapotassium di(peroxomonosulfate) di(sulfate) in product type 2 may be approved. The detailed grounds for the overall conclusion are described in the assessment report.

### 2. BPC Opinion

#### 2.1. BPC Conclusions of the evaluation

##### a) Presentation of the active substance including the classification and labelling of the active substance

Initially, pentapotassium bis(peroxymonosulphate) bis(sulphate)<sup>1</sup> was a notified name for the active substance. It was established that the name is incorrect, primarily due to a violation considering a charge balance. Consequently, the active substance has been renamed to trihydrogen pentapotassium di(peroxomonosulfate) di(sulfate) where the positions of the protons are not specified.

This evaluation covers the use of trihydrogen pentapotassium di(peroxomonosulfate) di(sulfate) in product type 2. The acronym KMPS stands for potassium monopersulfate, which is the common name for trihydrogen pentapotassium di(peroxomonosulfate) di(sulfate). Specifications for the reference source are established. Dipotassium peroxydisulphate is regarded as a relevant impurity with a max level of 20 g/kg.

The physico-chemical properties of the active substance and biocidal product have been evaluated and are deemed acceptable for the appropriate use, storage and transportation of the active substance and biocidal product.

Validated analytical methods are available for the active substance as manufactured and for the relevant impurity. Analytical methods for determination of the active substance in water, soil, body fluids and tissues, food and feed stuffs are not considered necessary because the active substance is unstable (reactive) inorganic salt of which the decomposition products (potassium and sulphate ions) are innocuous. For air an analytical method for dusts is available and for aerosols is missing and therefore required at product authorisation (see the section 2.5.).

A harmonised classification and labelling according to Regulation (EC) No 1272/2008 (CLP Regulation) is not available for the active substance. A CLH dossier has been resubmitted to ECHA in January 2023.

The proposed classification and labelling for trihydrogen pentapotassium di(peroxomonosulfate) di(sulfate) according to Regulation (EC) No 1272/2008 (CLP Regulation) is:

Proposed Classification according to the CLP Regulation	
Hazard Class and Category Codes	Acute Tox. 4, H302 Skin Corr. 1, H314 Eye Dam. 1, H318 STOT RE 1, H372 (eyes) Aquatic Acute 1, H400 Aquatic Chronic 3, H412

<sup>1</sup> <https://echa.europa.eu/de/substance-information/-/substanceinfo/100.067.959>

<b>Labelling</b>	
Pictogram codes	GHS07, GHS05, GHS09
Signal Word	Danger
Hazard Statement Codes	H302: Harmful if swallowed. H314: Causes severe skin burns and eye damage. H372: Causes damage to organs (eyes) through prolonged or repeated exposure. H410: Very toxic to aquatic life with long-lasting effects.
Suppl. Hazard Statement Code	EUH071: Corrosive to the respiratory tract. EUH208: Contains dipotassium peroxodisulphate (CAS 7727-21-1). May produce an allergic reaction.
<b>Specific Concentration limits, M-Factors</b>	
	M=1 (Aquatic Acute 1)

### b) Intended use, target species and effectiveness

The active substance trihydrogen pentapotassium di(peroxomonosulfate) di(sulfate) is intended to be used by professional and non-professional users for disinfection of swimming pool water. The user applies the product in form of tabs or granules. It is also intended to be used for disinfection of equipment by dipping and for disinfection of hard surfaces (PT 2) but by professional users only. KMPS is applied onto hard surfaces by spraying or by wiping with mop. KMPS shows a broad spectrum of antimicrobial activity and functions as a bactericide, yeasticide, fungicide and virucide.

Mode of action of KMPS is based on releasing reactive oxygen, which oxidises macromolecules of the cell wall, membranes and virus capsids in an unspecific manner leading to the cell wall disruption, loss of membrane integrity and disintegration of virus capsids. In addition, after penetration into cells or viruses, intracellular molecules such as amino acids, polypeptides, RNA and DNA are also oxidised leading to the disruption of protein synthesis and cell death.

The data on the active substance and the representative biocidal product have demonstrated sufficient efficacy against target species for the active substance approval. Considering that only innate efficacy of KMPS was demonstrated, additional data to support all intended uses against all claimed target organisms need to be provided during the biocidal product authorisation.

No resistance phenomenon has been reported with KMPS in the scientific literature for the time being. KMPS is an inorganic substance with an unspecific mode of action, hence the development of resistance to KMPS is a highly unlikely event.

### c) Overall conclusion of the evaluation including need for risk management measures

#### Human health

The mode of action of trihydrogen pentapotassium di(peroxomonosulfate) di(sulfate) is based on its oxidative reactivity. It reacts rapidly with available organic material at the site of first contact, leading to local corrosion/irritation. KMPS is corrosive to the skin, eyes, and mucous membranes (gastrointestinal and respiratory tracts). It causes damage to the eyes through repeated exposure, even at low doses.

KMPS dissociates at the first contact site in the organism into potassium and sulphate ions. Both breakdown products are the only species that can become systemically available. They

constitute physiologically essential metabolites in the human body which are efficiently excreted and are not toxic *per se*.

Due to rapid dissociation of KMPS at first contact site in organism into potassium and sulphate ions and the lack of primary systemically toxic effects after exposure to KMPS, no systemic reference values were derived for KMPS. Only local risk assessment was considered necessary for the use of KMPS. Oral and dermal NOAEC values were considered unnecessary due to the risk management measures that are to be applied due to the KMPS classification for corrosive properties. Therefore, only AEC<sub>inhalation</sub> of 0.175 mg/m<sup>3</sup> has been derived.

The risk assessment for the relevant impurity dipotassium peroxodisulphate (CAS-7727-21-1) is covered by the risk assessment for KMPS for the relevant impurity content ≤ 2%.

The table below summarises the exposure scenarios assessed.

<b>Summary table: human health scenarios</b>			
<b>Scenario</b>	<b>Primary or secondary exposure and description of scenario</b>	<b>Exposed group</b>	<b>Conclusion</b>
<b>Disinfection of swimming pools</b>			
Mixing & loading of granules – manual placing	<b>Primary exposure</b> during manual placing of KMPS granules (50 % KMPS, up 100 kg) into dosing device.  PPE: gloves, goggles, protective coveralls, RPE RMM for high hazard class chemicals <sup>2</sup>	Professionals	Acceptable with PPE and RMM
Mixing & loading of tabs – manual dosing	<b>Primary exposure</b> during manual dosing of KMPS tabs (50 % KMPS) into pool water.  RMM: labelling according to CLP, clear instructions for use and storage, product formulation that reduces dusting (e.g. granules, tablets, water soluble packaging, films covering surface), child proof closure, small package size, dose scoop or tool delivered with the product	Non-professionals	Acceptable with RMM
Application - Pool disinfection	<b>Primary exposure</b> during automated dosing of KMPS solution into pool water.	Professionals	Acceptable
Post-application – Handling empty containers	<b>Primary exposure</b> during handling of empty containers.	Professionals/ Non-professionals	Acceptable
Secondary exposure: Bystander during mixing & loading of granules - manual placing	<b>Secondary inhalation exposure</b> during manual placing of KMPS granules (50 % KMPS) into dosing device.  PPE: goggles, RPE	Professional bystanders	Acceptable with PPE
Secondary exposure: Swim instructor	<b>Secondary inhalation exposure</b> of a swim instructor supervising swimmers.	Professional bystanders	Acceptable
Secondary exposure: Swimming in pool	<b>Secondary oral, dermal and inhalation exposure</b> of general public (adult, child, baby) when swimming in disinfected pool water.	General public	Acceptable

<b>Dipping of equipment</b>			
Mixing & loading of granules – manual dosing	<b>Primary exposure</b> during manual dosing and dissolving of KMPS granules (50 % KMPS).  PPE: gloves, goggles, protective coveralls, RPE RMM for high hazard class chemicals <sup>2</sup>	Professionals	Acceptable with PPE and RMM
Application – Dipping of equipment	<b>Primary exposure</b> during dipping of equipment in the treatment solution.	Professionals	Acceptable
Post-application – Disposal of treatment solution	<b>Primary exposure</b> during disposal of treatment solution (emptying of dipping bath).	Professionals	Acceptable
Secondary exposure: Bystander during dipping	<b>Secondary inhalation exposure</b> of bystanders during disinfection of equipment by dipping.	Professional bystanders	Acceptable
<b>Surface disinfection of industrial areas by wiping with mop</b>			
Mixing & loading of granules – manual dosing	<b>Primary exposure</b> during manual dosing and dissolving of KMPS granules (50 % KMPS).  PPE: gloves, goggles, protective coveralls, RPE RMM for high hazard class chemicals <sup>2</sup>	Professionals	Acceptable with PPE and RMM
Application - Wiping	<b>Primary exposure</b> during wiping of surfaces in industrial areas with a mop	Professionals	Acceptable
Post-application – Disposal of treatment solution	<b>Primary exposure</b> during disposal of treatment solution (emptying of bucket).	Professionals	Acceptable
Secondary exposure: Bystander during wiping	<b>Secondary inhalation exposure</b> of bystanders during surface disinfection by wiping with mop.	Professional bystanders	Acceptable
<b>Surface disinfection of industrial areas by manual spraying (low pressure)</b>			
Mixing & loading of granules – manual dosing	<b>Primary exposure</b> during manual dosing and dissolving of KMPS granules (50 % KMPS).  PPE: gloves, goggles, protective coveralls, RPE RMM for high hazard class chemicals <sup>2</sup>	Professionals	Acceptable with PPE and RMM
Application - Spraying	<b>Primary exposure</b> during manual spraying of KMPS solution onto surfaces in industrial areas at low pressure.  PPE: goggles, RPE	Professionals	Acceptable with PPE
Post-application – Disposal of treatment solution	<b>Primary exposure</b> during disposal of treatment solution (emptying of spray equipment).	Professionals	Acceptable
Secondary exposure: Bystander during spraying	<b>Secondary inhalation exposure</b> of bystanders during surface disinfection by manual spraying.  PPE: goggles, RPE	Professional bystanders	Acceptable with PPE

<sup>2</sup> Guidance on the BPR: Volume III Human Health, Assessment + Evaluation (Parts B+C)



### Conclusion on risk assessment for the professional user

The exposure of a professional user during the use of KMPS for swimming pool disinfection, dipping of equipment, surface disinfection by wiping with a mop, and surface disinfection by manual spraying is considered acceptable assuming the use of suitable PPE/RPE when handling granules (50% KMPS, which is a corrosive concentration).

In-use concentrations do not trigger any classification for local effects, so no qualitative local risk assessment has been performed for the inhalation and dermal routes. Nevertheless, for primary inhalation exposure, a semi-quantitative local risk assessment has been conducted. Where it was concluded that due to an exceedance of  $AEC_{inhalation}$  RPE is needed for in-use concentrations, goggles should be used due to observed eye effects in the study used for AEC-derivation. A professional user must wear goggles and RPE during spraying.

The exposure of a professional bystander is not considered relevant or negligible for the dermal route. Inhalation exposure by a professional bystander is considered acceptable without the use of PPE, except in cases of mixing and loading tasks and spraying, where he must wear goggles and RPE.

### Conclusion on risk assessment for the non-professional user

The exposure of a non-professional user was assessed for the disinfection of swimming pools. Exposure during manual dosing of KMPS tablets into pool water is acceptable with product integrated RMMs -examples are packaging and formulation control measures or labelling instructions – that reduce dermal and inhalation exposure to an acceptable level.

### Conclusion on risk assessment for the general public

The general public is exposed when swimming in disinfected pool water. The exposure via inhalation, dermal, and oral routes is acceptable.

### Indirect exposure via food

According to Annex V of the Biocidal Product Regulation (EU) No. 528/2012 PT2 biocidal products are “used for the disinfection of surfaces, materials, equipment and furniture which are not used for direct contact with food or feeding stuffs”. Consequently, dietary exposure is not foreseen for PT2 uses.

### Disinfection by-products

Using KMPS for disinfection in the presence of chloride or bromide can lead to the formation of potentially hazardous disinfection by-products (DBPs). Guidance on DBPs is only available for swimming pool scenarios in PT 2. Consequently, further information on formation of DBPs is necessary at product authorisation for swimming pool disinfection using existing guidance, and for other uses on provision of suitable guidance.

## **Environment**

The fate of KMPS in the environment is determined by its oxidative reactivity. Upon contact with oxidizable organic substrate, KMPS decomposes either by hydrolysis or disproportionation to potassium ions, hydrogen sulphate and oxygen. Due to the high concentration of oxidizable organic substrate in sewage sludge and soil, decomposition in these compartments is very rapid. Leaching of KMPS in the soil profile to groundwater can therefore be excluded. In water, the rate of decomposition is dependent on the presence of oxidizable organic substrate as well as on the presence of sodium chloride. The higher the concentration of oxidizable organic substrate is in water, the faster KMPS will be degraded.

Compared to freshwater degradation in seawater is faster due to the oxidation of sodium chloride leading to the formation of hypochlorous acid. KMPS is neither volatile nor is it expected to be present in air. The potential for bioaccumulation is low.

The available data demonstrate a higher toxicity to marine species compared to freshwater species. Chronic data for marine species were relied upon to derive the PNEC for freshwater in the absence of chronic data for freshwater species. The sensitivity ranking of aquatic pelagic organisms based on chronic toxicity is fish  $\approx$  invertebrates  $\approx$  algae. For organisms in the terrestrial compartment, the PNEC derived with the EPM method is used in the risk assessment, as being more conservative than that derived experimentally.

For the product uses in PT2 KMPS is ultimately discharged to drains and STP after use. Environmental exposure via emission to drains and STP after use is taken to represent a worst-case in terms of exposure to the environment.

#### Disinfection by-products

KMPS can in the presence of chlorine or bromine lead to the formation of potentially hazardous disinfection by-products (DBPs), e.g., chlorate and bromate. The risk to the environment from exposure to disinfection by-products was not evaluated due to the absence of guidance.

The table below summarises the exposure scenarios assessed.

<b>Summary table: environment scenarios</b>		
<b>Scenario</b>	<b>Description of scenario including environmental compartments</b>	<b>Conclusion</b>
Disinfectant for public swimming pool, peak emission maintenance treatment (professional use)	KMPS will ultimately be discharged to drains and will enter a municipal STP. As a result of this, there will be potential for exposure of the aquatic compartment (surface water and sediment), air compartment and terrestrial compartment (soil and groundwater), the latter as a result of spreading contaminated sewage sludge on land.	Acceptable
Disinfectant for public swimming pool, chronic emission maintenance treatment (professional use)		Acceptable
Disinfectant for private swimming pool, peak emission maintenance treatment (non-professional use)		Acceptable
Disinfectant for private swimming pool, chronic emission maintenance treatment (non-professional use)		Not acceptable for Southern countries scenario Acceptable for Northern countries scenario
Disinfection of industrial areas		Acceptable
Disinfection of scopes and other articles in washers/disinfectors		Acceptable
Disinfection of medical equipment by dipping*		Acceptable

\* Disinfection of equipment used outside the scope of the Medical Devices Regulation (EU) 2017/745 is considered adequately covered by the existing environmental exposure scenario for disinfection by dipping of medical equipment.

It was verified that the consumption-based approach represents the worst-case for environmental risk assessment. PEC/PNEC ratios for STP and surface water are less than one, except for the PNEC/PNEC ratio for surface water in the Southern EU scenario of

chronic emission due to cleaning of filtration systems following use as disinfectant for private swimming pools. Terrestrial PEC/PNEC ratios for the product uses in PT2 are less than one, demonstrating that the risks to soil organisms are acceptable.

### Overall conclusion

Except for disinfection of private swimming pools by non-professionals for Southern Europe, an acceptable risk has been identified for the disinfection of swimming pool water by professional and non-professional users, for disinfection of equipment by dipping and for disinfection of hard surfaces by spraying or by wiping with mop when appropriate RMMs are in place for the mixing and loading phase in addition to PPE where required.

In conclusion, safe uses covering both the human health and the environment have been identified for PT 2.

## 2.2. Exclusion, substitution and POP criteria

### 2.2.1. Exclusion and substitution criteria

The table below summarises the relevant information with respect to the assessment of exclusion and substitution criteria:

Property		Conclusions	
CMR properties	Carcinogenicity (C)	no classification required	KMPS does not fulfil criterion (a), (b) and (c) of Article 5(1)
	Mutagenicity (M)	no classification required	
	Toxic for reproduction (R)	no classification required	
PBT and vPvB properties	Persistent (P) or very Persistent (vP)	Not P or vP	KMPS does not fulfil criterion (e) of Article 5(1) and does not fulfil criterion (d) of Article 10(1)
	Bioaccumulative (B) or very Bioaccumulative (vB)	Not B or vB	
	Toxic (T)	Not T	
Endocrine disrupting properties	Section A of Regulation (EU) 2017/2100: ED properties with respect to humans	No	KMPS does not fulfil criterion (d) of Article 5(1) and does not fulfil criterion (e) of Article 10(1)
	Section B of Regulation (EU) 2017/2100: ED properties with respect to non-target organisms	No	
	Article 57(f) and 59(1) of REACH	No	
	Intended mode of action that consists of controlling target organisms via their endocrine system(s)	No	

Property	Conclusions
Respiratory sensitisation properties	No classification required. KMPS does not fulfil criterion (b) of Article 10(1).
Concerns linked to critical effects other than those related to endocrine disrupting properties	KMPS does not fulfil criterion (e) of Article 10(1).
Proportion of non-active isomers or impurities	KMPS does not fulfil criterion (f) of Article 10(1).

Consequently, the following is concluded:

Trihydrogen pentapotassium di(peroxomonosulfate) di(sulfate) does not meet the exclusion criteria laid down in Article 5 of Regulation (EU) No 528/2012.

Trihydrogen pentapotassium di(peroxomonosulfate) di(sulfate) does not meet the conditions laid down in Article 10 of Regulation (EU) No 528/2012 and is therefore not considered as a candidate for substitution. The exclusion and substitution criteria were assessed in line with the "Note on the principles for taking decisions on the approval of active substances under the BPR", "Further guidance on the application of the substitution criteria set out under article 10(1) of the BPR" and "Implementation of scientific criteria to determine the endocrine –disrupting properties of active substances currently under assessment" agreed at the 54<sup>th</sup>, 58<sup>th</sup> and 77<sup>th</sup> meeting respectively, of the representatives of Member States Competent Authorities for the implementation of Regulation 528/2012 concerning the making available on the market and use of biocidal products. This implies that the assessment of the exclusion criteria is based on Article 5(1) and the assessment of substitution criteria is based on Article 10(1)(a, b, d, e and f).

### 2.2.2. POP criteria

POP criteria are not applicable to inorganic substances such as trihydrogen pentapotassium di(peroxomonosulfate) di(sulfate).

### 2.3. BPC opinion on the application for approval of the active substance trihydrogen pentapotassium di(peroxomonosulfate) di(sulfate) in product type 2

In view of the conclusions of the evaluation, it is proposed that trihydrogen pentapotassium di(peroxomonosulfate) di(sulfate) shall be approved and be included in the Union list of approved active substances, subject to the following specific conditions:

1. Specification: minimum purity of the active substance evaluated:  $\geq 890$  g/kg ( $\geq 89$  w/w), dipotassium peroxydisulphate (relevant impurity):  $\leq 20$  g/kg ( $\leq 2$  % w/w).
2. The authorisations of biocidal products are subject to the following conditions:
  - a. The product assessment shall pay particular attention to the exposures, the risks and the efficacy linked to any uses covered by an application for

authorisation, but not addressed in the Union level risk assessment of the active substance.

- b. In view of the risks identified for the uses assessed, the product assessment shall pay particular attention to:
- i. Professional users.
  - ii. Non-professional users.
  - iii. Surface water due to chronic emission following private swimming pool disinfection.

The active substance does not fulfil the criteria according to Article 28(2) to enable inclusion in Annex I of Regulation (EU) 528/2012 as the active substance is proposed to be classified as Skin Corr. 1 (H314), STOT RE 1 (H372 (eyes)) and Aquat. Acute 1 (H400).

#### **2.4. Elements to be taken into account when authorising products**

The following recommendations and risk mitigation measures have been identified for the uses assessed. Authorities should consider these risk mitigation measures when authorising products, together with possible other risk mitigation measures, and decide whether these measures are applicable for the concerned product:

- a. If an unacceptable risk is identified for professional users, safe operational procedures and appropriate organizational measures shall be established. Products shall be used with appropriate personal protective equipment where exposure cannot be reduced to an acceptable level by other means.
- b. Disinfection by-products may be formed because of the use of KMPS in the presence of chloride or bromide. Further information on formation of DBPs is necessary at product authorisation for the PT2 use in swimming pools disinfection and for other PT2 uses on provision of suitable guidance.
- c. An unacceptable risk in surface water is identified for the Southern EU scenario of chronic emission due to cleaning of filtration systems following use as disinfectant for private swimming pools. If the risk cannot be reduced to an acceptable level by appropriate risk mitigation measures or by other means at product authorisation level in Southern European countries, this use should not be authorized.

#### **2.5. Requirement for further information**

Sufficient data have been provided to verify the conclusions on the active substance, permitting the proposal for the approval of trihydrogen pentapotassium di(peroxomonosulfate) di(sulfate). However, the validated analytical method for the determination of the active substance (aerosols) in air has to be provided to the Competent Authority Slovenia as soon as possible but not later than 6 months before the date of approval of the active substance.