Biocidal Products Committee (BPC)

Opinion on the application for approval of the active substance:

Ozone generated from oxygen

Product type: PT 4

ECHA/BPC/351/2022

Adopted

26 September 2022

Opinion of the Biocidal Products Committee

on the application for approval of the active substance Ozone generated from oxygen for product type 4

In accordance with Article 93 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 4 of the following active substance:

Common name:	**Ozone generated from oxygen**
Chemical name:	**Ozone**
EC No.:	**Not applicable for an *in situ* generated active substance**
CAS No.:	**Not applicable for an *in situ* generated active substance**

New active substance submitted under Article 93 of the BPR

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 BPC opinions

Following the submission of an application by The European Ozone Trade Association Limited on 22 August 2016, the evaluating Competent Authority the Netherlands submitted an assessment report and the conclusions of its evaluation to ECHA on 28 October 2021. In order to review the assessment report and the conclusions of the evaluating Competent Authority, the Agency organised consultations via the BPC (BPC-xx) and its Working Groups (WG II 2022). Revisions agreed upon were presented and the assessment report and the conclusions were amended accordingly.

Another application for the same active substance submitted by EurO3zon on 5 June 2015 was evaluated by the evaluating Competent Authority Germany. The BPC adopted the opinion (ECHA/BPC/304/2021) on this application at BPC-41 which is published on the ECHA web-site at: https://echa.europa.eu/documents/10162/077c4484-7b5c-7584-ae62-d67b9668db21.

Adoption of the BPC opinion

Rapporteur: The Netherlands

The BPC opinion on the approval of the active substance Ozone generated from oxygen in product type 4 was adopted on 26 September 2022.

The BPC opinion was adopted by consensus.

The opinion is published on the ECHA web-site 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 active substance Ozone generated from oxygen in product type 4 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

This evaluation covers the use of Ozone generated from oxygen in product type 4. The active substance Ozone generated from oxygen is generated *in situ*. The assessed concentrations correspond to pure (100%) ozone unless stated otherwise. The physico-chemical properties of the active substance have been evaluated and are deemed acceptable for the appropriate use of the active substance. The product is defined as an *in situ* generated substance generated from the nonmarketable precursors ambient air and water or liquid oxygen (not supplied with the intention to generate ozone). For product authorization, physical, chemical and technical properties for the *in situ* systems under consideration (ozone generated from oxygen) only need to be reported as far as they are relevant for the SPC.

Validated analytical methods are available for the relevant matrices air and water. Analytical methods for the determination of ozone in soil, body fluids and tissues, food and feed stuffs are not considered necessary based upon the very short half-life of ozone.

A harmonised classification is not available for ozone. A CLH dossier was submitted to ECHA on 24 July 2020.The proposed classification and labelling for ozone according to Regulation (EC) No 1272/2008 (CLP Regulation) is:

Proposed classification according to the CLP Regulation[1]	
Hazard Class and Category Codes	Ox. Gas 1, H270 Acute Tox. 1, H330 STOT SE 1, H370 STOT SE3, H335 STOT RE1, H372 Muta. 2, H341 Carc. 2, H351 Aquatic acute 1; H400 Aquatic chronic 1; H410
Labelling	
Pictograms	GHS03, GHS06, GHS07, GHS08, GHS09
Signal Word	Danger
Hazard Statement Codes	H270: May cause or intensify fire: oxidizer H330: Fatal if inhaled H370: Causes damage to organs (nervous system) H335: May cause respiratory irritation H372: Causes damage to organs through prolonged or repeated exposure (cardiovascular, nervous, respiratory system)

[1] The NL CA being the eCA of this second application for "ozone generated from oxygen" comes to a different conclusion in relation to skin and eye irritation/corrosion. Based on the same data, the NL CA proposes to classify ozone as Skin Irrit., H315 and Eye Irrit., H319.

	H341: Suspected of causing genetic defects H351: Suspected of causing cancer H410: Very toxic to aquatic life with long lasting effects
Specific Concentration limits, M-Factors	M = 100 for acute toxicity to aquatic life M = 1 for chronic toxicity to aquatic life
Justification for the proposal	
-	

b) Intended use, target species and effectiveness

The intended use automated airborne disinfection of surfaces with gaseous ozone was evaluated. The efficacy tests that were provided for the active substance approval for ozone generated from oxygen proved yeasticidal efficacy and substantiate the use of ozone as a biocide in PT 4 for professional use.

The phase 2, step 1 testing proved difficult for ozone due to the fact that it is a reactive, gaseous biocide that in use conditions is applied continuously. Therefore, these tests did not provide reliable efficacious in-use concentrations and contact times. For product authorization novel tests and/or test strategies may need to be developed to substantiate the intended uses for ozone.

Ozone is a strong oxidant. It is this property which makes it very effective in destroying microorganisms. The inactivation takes place mainly as a result of damaging vital cellular components.

The technical active substance generated *in situ* and the biocidal product are identical. There are no reported cases of resistance to ozone from any generation method.

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

Human health

Considering PT4 use, there are no specified toxicological oral or dermal endpoints. For this reason, oral or dermal systemic exposure is not relevant and only a risk characterisation for local dermal and oral effects is performed. The primary toxic dermal effect of ozone is likely to be contact irritation with no significant penetration being expected from dermal exposure to sub-irritant concentrations. Exposure to an irritant concentration would be reversible in time, and a few droplets spread over the skin surface, although temporarily altering the local skin chemistry, would be expected to rapidly return to within physiological limits because of the diluting effect of sweat and the buffering capacity of the acidic mantle.

For the exposure assessment, in a controlled human volunteer study a NOAEC of 40 ppb was derived based on changes in lung function (FVC, FEV1.0) and symptoms score at LOAEC of 80 ppb. As supporting studies on airway inflammation reported upregulation of lung cytokines and immune cells from the level 80 ppb, a NOAEC 60 ppb from changes in lung function can be used for risk assessment for short-term exposure.

For ozone there is no indication for the existence of NOAECs/NOAELs from the relevant epidemiological studies submitted for the critical effect mortality. In addition, ozone was identified as a suspected genotoxic carcinogen. In the absence of suitable information, the existence of a threshold for this effect cannot be assumed. As AEL values cannot be derived for suspected genotoxic carcinogens without established threshold, a minimal effect level (MEL) is proposed in analogy to the DMELs under REACH.

The table below summarises the exposure scenarios assessed.

Summary table: human health scenarios			
Scenario	**Primary or secondary exposure and description of scenario**	**Exposed group**	**Conclusion**
Automated application - ozone in air	Primary exposure: disinfection of hard surfaces / room disinfection (including equipment) through air-space treatment	Professionals	Acceptable (with RMMs)
Automated application – ozone in air	Secondary exposure: post-application entry into treated area after air-space treatment	Bystanders	Acceptable (ozone level is below the respective reference values before for re-entry)

Conclusion of risk characterisation for professional user

Ozone in air

Using the appropriate engineering controls, professional operators are not expected to be exposed to any ozone during its application. Engineering controls, (i.e. remote ozone monitors), access to treatment areas and other adjacent areas is restricted during application (i.e. doors and windows are locked and sealed with adhesive tape; ventilation and fire alarm covers are installed and warning signs placed around the treatment area) and operator trained to ensure there is minimal risk of exposure of professionals to ozone.

To ensure the safety of the operator on re-entry, portable monitoring equipment is used to confirm the ozone level is below the respective reference values before for re-entry is permitted for any extended period of time.

Conclusion of risk characterisation for non-professional user

Not applicable.

Bystander exposure

Local effects for a bystander through acute dermal contact at the applied ozone concentrations are considered negligible. Inhalation exposure following surface disinfection applied by both professionals is less than the MEL. As secondary exposure is not expected to exceed that of the applicator, no risk to bystanders has therefore been identified for the dermal and inhalation route. Moreover, during automated application no persons are allowed to be present in the treatment room.

Indirect exposure via food

Residues in food or feed from the intended uses of ozone in PT 4 biocidal products are not expected due to the rapid rate of degradation of ozone in air and water. Ozone evaporates or degrades completely within the time of application so that no subsequent transfer from treated surfaces to food should occur. According to the WHO[2] 'Ozone decomposes rapidly to by-products of ozonation following application, and for this reason no guidance value was proposed for ozone'. This is further substantiated by the WHO's statement that a disadvantage to ozone includes its lack of disinfectant residual'. For this reason and in agreement with the approach adopted by the World Health Organization, no dietary reference values for ozone were considered necessary and a dietary risk assessment is

[2] https://www.who.int/water_sanitation_health/dwq/S04.pdf

considered unnecessary at this time. Ozone for disinfection can lead to the formation of potential health hazardous disinfection by-products. As a result, DBPs could be present in food and drinking water after contact with treated surfaces. The assessment of DBPs can be performed at product authorisation.

DBPs

It is known that using ozone for disinfection can lead to the formation of potential health hazardous disinfection by-products (DBPs) e.g. bromate. However, it is recognised that the draft guidance on DBPs is only available for swimming pools scenarios in PT 2. Due to the complex nature of predicting the compounds formed as DBPs, where the available data are applicable to drinking and swimming pool water and the scenarios presented in the current assessment, it is considered that the application of inappropriate guidance to substances and scenarios that have not been adequately investigated or reviewed in the formal guidance would result in unreliable conclusions. Therefore, no further consideration of disinfectant by-products is required as a risk assessment cannot be performed. The assessment of DBPs can be performed at product authorisation on provision of suitable guidance.

Endocrine disruption

A full assessment on the endocrine disrupting properties relevant to human health was performed in accordance with the Commission Delegated Regulation (EU) 2017/2100 and the Guidance for the identification of endocrine disruptors in the context of Regulations (EU) no 528/2012 and (EC) No 1107/2009. Ozone is not considered to be an endocrine disruptor with respect to human health when applying the specific scientific criteria for endocrine disruption.

Environment

The table below summarises the exposure scenarios assessed.

Summary table: environment scenarios		
Scenario	**Description of scenario including environmental compartments**	**Conclusion**
PT04*		
large scale catering kitchens, canteens, slaughterhouses and butcheries – use of ozone in water	Emission to the sewer and subsequent emission to surface water Emission to air	acceptable
Disinfectants used for milking parlour systems – use of ozone in water		

* The scenarios presented here also cover the use of ozone of air in rooms.

No risk has been identified for any of the applications within PT04 with release to the sewer as ozone degrades rapidly. Ozone may however result in disinfection by-products that might pose potential risks for the environment. The information currently available is however insufficient to draw final conclusions regarding the risks of disinfection by-products. These need to be addressed during product authorisation.

An assessment on the endocrine disrupting properties relevant to the environment was performed in accordance with the Commission Delegated Regulation (EU) 2017/2100 and

the Guidance for the identification of endocrine disruptors in the context of Regulations (EU) no 528/2012 and (EC) No 1107/2009. Ozone is not considered to be an endocrine disruptor with respect to the environment when applying the specific scientific criteria for endocrine disruption.

Overall conclusion

A safe use for human health and the environment is identified for all intended uses of ozone generated from oxygen within PT04.

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)	Cat 2	Ozone generated from oxygen does not fulfil criterion (a), (b) and (c) of Article 5(1)
	Mutagenicity (M)	Cat 2	
	Toxic for reproduction (R)	no classification required	
PBT and vPvB properties	Persistent (P) or very Persistent (vP)	not P or vP	Ozone generated from oxygen 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)	T	
Endocrine disrupting properties	Section A of Regulation (EU) 2017/2100: ED properties with respect to humans	No	Ozone generated from oxygen does not fulfil criterion (e) 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	No	

Property		Conclusions	
CMR properties	Carcinogenicity (C)	Cat 2	Ozone generated from oxygen does not fulfil criterion (a), (b) and (c) of Article 5(1)
	Mutagenicity (M)	Cat 2	
	Toxic for reproduction (R)	no classification required	
PBT and vPvB properties	Persistent (P) or very Persistent (vP)	not P or vP	Ozone generated from oxygen 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)	T	
	endocrine system(s).		
Respiratory sensitisation properties	No classification required.		
Concerns linked to critical effects other than those related to endocrine disrupting properties	Ozone generated from oxygen does not fulfil criterion (e) of Article 10(1).		
Proportion of non-active isomers or impurities	Ozone generated from oxygen does not fulfil criterion (f) of Article 10(1).		

Consequently, the following is concluded:

Ozone generated from oxygen does not meet the exclusion criteria laid down in Article 5 of Regulation (EU) No 528/2012.

Ozone generated from oxygen 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"[3], "Further guidance on the application of the substitution criteria set out under article 10(1) of the BPR"[4] and "Implementation of scientific criteria to determine the endocrine –disrupting properties of active substances currently under assessment[5]" agreed at the 54th, 58th and 77th 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

[3] See document: Note on the principles for taking decisions on the approval of active substances under the BPR (available from https://circabc.europa.eu/d/a/workspace/SpacesStore/c41b4ad4-356c-4852-9512-62e72cc919df/CA-March14-Doc.4.1%20-%20Final%20-%20Principles%20for%20substance%20approval.doc)
[4] See document: Further guidance on the application of the substitution criteria set out under article 10(1) of the BPR (available from https://circabc.europa.eu/d/a/workspace/SpacesStore/dbac71e3-cd70-4ed7-bd40-fc1cb92cfe1c/CA-Nov14-Doc.4.4%20-%20Final%20-%20Further%20guidance%20on%20Art10(1).doc)
[5] See document: Implementation of scientific criteria to determine the endocrine –disrupting properties of active substances currently under assessment (https://circabc.europa.eu/sd/a/48320db7-fc33-4a91-beec-3d93044190cc/CA-March18-Doc.7.3a-final-%20EDs-%20active%20substances%20under%20assessment.docx).

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

Ozone generated from oxygen does not fulfil the criterion for being a B substance. It is neither P nor does it show a potent ial for long-range transport. Hence, ozone generated from oxygen does not meet the criteria for being a persistent organic pollutant.

2.3. BPC opinion on the application for approval of the active substance ozone generated from oxygen in product type 4

In view of the conclusions of the evaluation, it is proposed that ozone generated from oxygen 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: For ozone generated from the precursor oxygen the specification is set in accordance to DIN EN 12876:2015 with a minimum purity of 90%. Oxygen shall be supplied from sources complying with this norm. For product authorisation, compliance with this norm shall be demonstated by submission of certificates of analysis. For water and air, no specification was set.

2. The authorisations of biocidal products are subject to the following condition(s):

    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. General public.

3. For products that may lead to residues in food or feed, the need to set new or to amend existing maximum residue levels (MRLs) in accordance with Regulation (EC) No 470/2009 of the European Parliament and of the Council or Regulation (EC) No 396/2005 of the European Parliament and of the Council shall be verified, and any appropriate risk mitigation measures shall be taken into account to ensure that the applicable MRLs are not exceeded.

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 ozone is proposed to be classified as Acute Tox. 1 (H330), STOT SE 1 (H370), STOT SE3 (H335), STOT RE1 (H372), Muta. 2 (H341), Carc. 2 (H351), Aquatic acute (H400).

2.4. Elements to be taken into account when authorising products

Authorities should assess whether authorisation of a biocidal product for use by the general public is possible considering the compliance with Article 19(4) of Regulation (EU) 528/2012.

1. 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. For products that may lead to residues in food or feed a dietary risk assessment has to be performed at product authorization level. Particular attention should be given to applications that include contact of food with ozone and/or related disinfection by-products.

c. Residues of ozone and related disinfection by-products in the relevant matrix air or water from the intended uses shall comply with EU or national regulations. Data on typical levels of ozone and disinfection by-products in the relevant matrix air or water specific for the intended uses and related conditions shall be provided at product authorisation level.

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 ozon generated from oxygen.

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