

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

Opinion on the application for approval of the active substance:

**Active chlorine released from calcium hypochlorite**

**Product type: 2**

ECHA/BPC/132/2016

Adopted

14 December 2016



## Opinion of the Biocidal Products Committee

### on the application for approval of the active substance active chlorine released from calcium hypochlorite 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>active chlorine released from calcium hypochlorite*</b>
<b>Chemical name of the releaser:</b>	<b>calcium hypochlorite</b>
<b>EC No. of the releaser:</b>	<b>231-908-7</b>
<b>CAS No. of the releaser:</b>	<b>7778-54-3</b>
<b>Existing active substance</b>	

\*as in *CA-March15-Doc.5.1-Final, Revised on 23 June 2015, Annex II – Releasers*

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 Euro Chlor Calcium Hypochlorite Registration Group on 31 July 2007, the evaluating Competent Authority Italy submitted an assessment report and the conclusions of its evaluation to the Commission on 7 July 2010. In order to review the assessment report and the conclusions of the evaluating Competent Authority, the Commission organised consultations via the Technical Meetings (TM-I-2012 and TM-II-2012) and the Agency organised consultations via the BPC (BPC-18) and its Working Groups (WG-II-2016, WG-III-2016 and WG-IV-2016). Revisions agreed upon were presented and the assessment report and the conclusions were amended accordingly.

## **Adoption of the BPC opinion**

### **Rapporteur: Italy**

The BPC opinion on the approval of the active substance active chlorine released from calcium hypochlorite in product type 2 was adopted on 14 December 2016.

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 active chlorine released from calcium hypochlorite 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

This evaluation covers the use of active chlorine released from calcium hypochlorite in product type 2. Active chlorine is efficacious chlorine or available/releasable chlorine that is disinfectant, algacide, fungicide and microbiocide. Upon use calcium hypochlorite releases active chlorine by hydrolysing in water to hypochlorous acid, which can further react to chlorine depending on pH. The ratio of chlorine, hypochlorous acid and hypochlorite anion in the equilibrium aqueous solution is pH and temperature dependent. The evaluation is based on the assessment of the releaser: calcium hypochlorite, and of the active substance: active chlorine, being the equilibrium aqueous solution. Specifications for the reference sources are established.

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

A validated analytical method is available for calcium hypochlorite as manufactured and for the active substance. No validated analytical methods are available for the relevant impurity calcium chlorate and some other impurities (see section 2.5). A validated analytical method is required for the relevant matrix drinking water. However, for drinking water a validated analytical method is missing and required at product authorisation (see section 2.5). For chlorate, a relevant metabolite, a validated analytical method is required for drinking water but not available (see section 2.5).

Since in aqueous solution active chlorine is released from calcium hypochlorite to give an equilibrium of chlorine, hypochlorous acid and hypochlorite anion, which is pH and temperature dependent, classification for active chlorine is not feasible.

The harmonised classification and labelling for the releaser calcium hypochlorite according to Regulation (EC) No 1272/2008 (CLP Regulation) is:

<b>Classification according to the CLP Regulation</b>	
Hazard Class and Category Codes	Ox. Sol. 2: H272 Acute Tox. 4*: H302 Skin Corr. 1B: H314 Aquatic Acute 1: H400
Suppl. Hazard statement code	EUH031
<b>Labelling</b>	
Pictogram codes	GHS03, GHS05, GHS07 and GHS09
Signal Word	Danger
Hazard Statement Codes	H272: May intensify fire; oxidiser H302: Harmful if swallowed

	H314: Causes severe skin burns and eye damage H400: Very toxic to aquatic life
Suppl. Hazard statement code	EUH031: Contact with acids liberates toxic gas
<b>Specific Concentration limits, M-Factors</b>	Skin Corr. 1B; H314: $C \geq 5\%$ Skin Irrit. 2; H315: $1\% \leq C < 5\%$ Eye Dam. 1; H318: $3\% \leq C < 5\%$ Eye Irrit. 2; H319: $0.5\% \leq C < 3\%$  M = 10  Note T
<b>Justification for the proposal</b>	
-	

Based on the results of the evaluation it is proposed to amend the classification by adding a classification for acute toxicity via inhalation. The proposed classification and labelling for the releaser calcium hypochlorite according to Regulation (EC) No 1272/2008 (CLP Regulation) by the evaluating Competent Authority (eCA; Italy) is:

<b>Classification according to the CLP Regulation</b>	
Hazard Class and Category Codes	Ox. Sol. 2: H272 Acute Tox. 4: H302 Acute Tox. 3: H331 Skin Corr. 1B: H314 Aquatic Acute 1: H400
Suppl. Hazard statement code	EUH031: Contact with acids liberates toxic gas  EUH071: Corrosive to the respiratory tract
<b>Labelling</b>	
Pictogram codes	GHS03, GHS05, GHS06 and GHS09
Signal Word	Danger
Hazard Statement Codes	H272: May intensify fire; oxidiser H302: Harmful if swallowed H314: Causes severe skin burns and eye damage H331: Toxic if inhaled H400: Very toxic to aquatic life
Suppl. Hazard statement code	EUH031: Contact with acids liberates toxic gas
<b>Specific Concentration limits, M-Factors</b>	Skin Corr. 1B; H314: $C \geq 5\%$ Skin Irrit. 2; H315: $1\% \leq C < 5\%$ Eye Dam. 1; H318: $3\% \leq C < 5\%$ Eye Irrit. 2; H319: $0.5\% \leq C < 3\%$  M = 10  Note T
<b>Justification for the proposal</b>	
-	

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

Active chlorine has strong bactericidal, fungicidal, sporicidal and virucidal activity. In PT 2, active chlorine released from calcium hypochlorite is used for: i) treatment of sewage and waste water (including municipal waste water): before receiving the waste water plant (pre-

chlorination) and after the waste water plant (5-40 mg/L active chlorine). Professional use only; ii) disinfection of swimming pools (public and private pools), continuous flow and shock dosing (3 and 50 mg/L active chlorine, respectively). Professional and non-professional use.

The efficacy depends on the active chlorine concentration and decreases with an increase in pH and vice versa, which is parallel to the concentration of hypochlorous acid. The efficacy is strongly reduced by the presence of organic load and in general by the presence of particles. Sufficient information for the active substance is available to conclude that biocidal products may be expected to be efficacious against the target organisms.

Although different species vary in their sensitivity to active chlorine, development of acquired resistance is not expected since its multiple molecular sites of attack on the surface and within the microbial cells. For the same reasons cross-resistance is not to be expected, nor has it been observed.

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

#### **Human health**

In water, calcium hypochlorite dissociates into calcium cation and hypochlorite anion, which is characterised by its well-known irritating/corrosive effects. Further, the hypochlorite is in equilibrium with hypochlorous acid and chlorine. The remaining calcium ion is a physiologically essential element and required in the intermediary metabolism and can therefore not be regarded as typical xenobiotic when entering the body. The levels of calcium intakes in humans possibly associated with health effects (i.e. higher than the tolerable daily intake for calcium) cannot be reached following exposure to calcium hypochlorite, due to the irritant/corrosive effects of the chemical. The primary effect of calcium hypochlorite is driven by the corrosive/irritant properties caused by the local reaction of the hypochlorite ion. Calcium hypochlorite does not become systemically available upon dermal contact, ingestion or inhalation. Any systemic effects seen in animal studies are considered to be secondary to local irritation/corrosion. Consequently, only a local risk assessment (quantitative and/or qualitative as appropriate) was performed for all relevant routes of exposure (i.e. oral, dermal, inhalation).

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>
Sewage/waste water disinfection	Disinfection of sewage/waste water before/after the waste water plant Primary dermal and inhalation exposure: - mixing & loading: dump product into storage containers (gloves, goggles, protective clothing, closed footwear, RPE10) - automated dosing system - handling/disposing containers - maintenance of the dosing system (gloves, goggles, protective clothing, closed footwear)	Professional users	Acceptable with PPE/RPE
Disinfection of public swimming pools	Both in-use /shock dosing considered. Primary dermal and inhalation exposure: - mixing & loading: dump product into storage containers (gloves, goggles, protective clothing, closed footwear, RPE10) - automated dosing system - handling/disposing containers - maintenance of the dosing system (gloves, goggles, protective clothing, closed footwear)	Professional users	Acceptable with PPE/RPE
Disinfection of private swimming pools	Both in-use /shock dosing considered. Primary dermal and inhalation exposure: - manually dump product into the storage container (hopper) of the automated dosing system or directly into the pool. (product integrated RMMs assumed reducing exposure to product) - maintenance of the dosing system	Non-professional users	Acceptable
Bystanders during mixing and loading	Secondary inhalation exposure of professional bystanders during mixing and loading (RPE10)	Bystanders (professionals)	Acceptable with RPE
Swim instructor	Secondary inhalation exposure of swim instructor	Swim instructor	Acceptable
Swimming	Secondary exposure of swimming pool users. Oral, dermal and inhalation exposure are considered.	General public: baby, child, adult	Acceptable

For primary exposure scenarios, a local risk assessment was performed considering dermal and inhalation exposures. All primary exposure scenarios were acceptable provided appropriate RMMs are in place.

For the tasks carried out by professional users, personal protective equipment (PPE) is required for the mixing and loading (gloves, goggles, protective clothing, closed footwear, RPE10) as well as the maintenance (gloves, goggles, protective clothing, closed footwear) tasks, in addition to other RMMs, including engineering controls, safe operational procedures and appropriate organizational measures.

The product for the evaluation of the risks for non-professional uses was a dummy product, which should not be authorised for the use by the general public as it is classified for acute



toxicity, cat. 3. However, this dummy product was considered as a worst-case, therefore the outcome of the risk assessment will only relate to a product that is not classified for acute tox inhalation 3. For non-professional users for the tasks where exposure triggering local effects is possible, e.g. handling of the solid product, adequate product integrated risk mitigation measures are required to limit dermal contact. These measures may include engineering controls, like packaging, formulation controls etc.

Due to the high reactivity of chlorine species such as hypochlorite, residues on surfaces degrade rapidly. Moreover, in-use dilutions are of low concentration. Due to the rapid chemical degradation and the local mode of action, only acute secondary scenarios were considered relevant. Secondary exposure scenarios covered inhalation exposure of bystanders and swim instructor as well as all exposure routes for swimmers. All secondary exposure scenarios are acceptable, for sewage disinfection professional bystanders are also required to apply appropriate RPE when mixing and loading tasks are performed.

Due to absence of guidance, disinfection-by-products were not evaluated. However, guidance is under development for human risk assessment of disinfection by-products, in particular for human exposure in swimming-water treated with halogenated disinfectants.

## **Environment**

The sum of the hypochlorite ion, hypochlorous acid and chlorine is defined as active chlorine or available chlorine. For the chemical reactivity in an aqueous solution with the same active chlorine concentrations and the same pH conditions, it is irrelevant whether active chlorine is generated from either chlorine gas, calcium hypochlorite or sodium hypochlorite. Therefore, all studies investigating hypochlorite aqueous solutions were used for the evaluation and assessment of active chlorine released from any of the three substances. For the water compartment algae were the most sensitive species in long term testing. No toxicity data were available for sediment and soil organisms, so the thresholds for these compartments were calculated from data for aquatic organisms using the equilibrium partitioning method. Active chlorine is highly reactive: it reacts rapidly with organic matter in the sewer, sewage treatment plant (STP), surface water and soil. Where organic matter is present, it acts as a highly reactive oxidizing agent. Subsequently, in all compartments active chlorine degrades rapidly. Degradation was taken into account during the disinfection process, between release to the facility drain to the STP, in the STP and after release of the effluent or sludge from the STP to the environment in the compartments surface water, sediment and soil.

Disinfectant by-products are formed due to the use of active chlorine, for example in the STP. This 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>
Disinfection of sewage/ waste water in the primary settler of the STP (pre-chlorination)	Sewage Treatment Plant (STP), air, surface water, sediment, soil and groundwater	Acceptable
Disinfection of sewage/ waste water in the effluent stream of the STP (post-chlorination)	Sewage Treatment Plant, air, surface water, sediment, soil and groundwater	Acceptable if the STP has technical systems (e.g. labyrinths and/or a release pipe) leading to a residence time of more than 30 minutes or a faster reduction of active chlorine before the effluent is discharged into the surface water
Disinfection of public swimming pools	Sewage Treatment Plant, air, surface water, sediment, soil and groundwater	Acceptable
Disinfection of private swimming pools	Sewage Treatment Plant, air, surface water, sediment, soil and groundwater	Acceptable

Acceptable risks were identified for all compartments for disinfection of sewage / waste water in the primary settler of the STP for the pre-chlorination scenario. For the other scenarios risks were identified for surface water, STP (in case of disinfection of private and public swimming pools, shock dosing) and sediment when no degradation in the sewer was assumed.

For disinfection of sewage / waste water (pre-chlorination) and disinfection of public and private swimming pools, if degradation was assumed in the sewer (considering a realistic worst-case approach with respect to the value for the residence time), the risks for surface water and sediment were acceptable.

For disinfection of sewage / waste water in the effluent stream of the STP (post-chlorination) obviously there is no degradation in the sewer system. In the risk assessment a residence time of 30 minutes is assumed before the effluent is discharged into the surface water. Technical systems (e.g. labyrinths and longer release pipes) may exist which allow a longer residence time or a faster reduction in the effluent of the STP. Furthermore, post-chlorination disinfection is only required if a high load with e.g. *E. coli* occurs. Therefore, it could be expected that organic material is still available which would result in a higher degradation rate compared to the one used in the risk assessment.

No unacceptable risks were identified for the soil compartment and for groundwater for all scenarios. For the air compartment the volatilisation of hypochlorite from the STP was considered. As the predicted concentrations were very low the risks for air were considered acceptable.

### **Overall conclusion**

Acceptable risks were identified for all scenarios for human health when appropriate RMMs are in place to prevent local effects. Acceptable risks were identified for the environment, with the exception of the post-chlorination disinfection of STPs. This scenario is acceptable with the condition that a STP has labyrinths and/or a release pipe leading to a residence time before the effluent is discharged into the surface water of more than 30 minutes.

## 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	Active chlorine released from calcium hypochlorite 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	Active chlorine released from calcium hypochlorite 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	Active chlorine released from calcium hypochlorite is not considered to have endocrine disrupting properties. Active chlorine released from calcium hypochlorite does not fulfil criterion (d) of Article 5(1).		
Respiratory sensitisation properties	No classification required. Active chlorine released from calcium hypochlorite does not fulfil criterion (b) of Article 10(1).		
Concerns linked to critical effects	Active chlorine released from calcium hypochlorite does not fulfil criterion (e) of Article 10(1).		
Proportion of non-active isomers or impurities	Active chlorine released from calcium hypochlorite does not fulfil criterion (f) of Article 10(1).		

Consequently, the following is concluded:

Active chlorine released from calcium hypochlorite does not meet the exclusion criteria laid

down in Article 5 of Regulation (EU) No 528/2012.

Active chlorine released from calcium hypochlorite 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"<sup>1</sup> and in line with "Further guidance on the application of the substitution criteria set out under article 10(1) of the BPR"<sup>2</sup> agreed at the 54<sup>th</sup> and 58<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 active chlorine released from calcium hypochlorite.

### **2.3. BPC opinion on the application for approval of the active substance active chlorine released from calcium hypochlorite in product type 2**

In view of the conclusions of the evaluation, it is proposed that active chlorine released from calcium hypochlorite 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 releaser calcium hypochlorite:  $\geq 655$  g/kg (i.e.  $\geq 65.5\%$  w/w, equivalent to an active chlorine content of  $65\%$  w/w). Calcium chlorate (relevant impurity):  $\leq 50$  g/kg (i.e.  $\leq 5\%$  w/w).
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. Professionals and non-professionals;
    - ii. Surface water and sediment for disinfection of sewage / waste water in the effluent stream of the Sewage Treatment Plant (post-chlorination).

Calcium hypochlorite is classified for skin corrosion category 1B and aquatic acute category 1. The active substance does fulfil the criteria according to Article 28(2)(a) and therefore active chlorine released from calcium hypochlorite cannot be included in Annex I of Regulation (EU) 528/2012.

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

<sup>1</sup> 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>)

<sup>2</sup> 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](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))

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. If an unacceptable risk is identified for non-professional users due to exposure to the biocidal product triggering local effects, appropriate product integrated risk mitigation measures, like packaging and/or formulation controls, or other engineering controls shall be applied.
  - c. Due to the potential formation of chlorine, labels, and where provided safety data sheets, shall indicate that biocidal products for swimming pool disinfection should be stored in a dry place in a well-sealed package.
  - d. An unacceptable risk for surface water and sediment is identified for disinfection of sewage / waste water in the effluent stream of the Sewage Treatment Plant (post-chlorination). If the risk cannot be reduced to an acceptable level by appropriate risk mitigation measures or by other means products should not be authorised or labels and where provided Safety Data Sheets should indicate that the residence time before the effluent is discharged into the surface water of the treated STP needs to be more than 30 minutes.
  - e. Disinfectant by-products are formed as a consequence of the use of active chlorine released from calcium hypochlorite. Due to the absence of guidance, which is under development, an assessment of the risks of disinfectant by-products could not be performed. When guidance becomes available this will have to be performed.

## **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 active chlorine released from calcium hypochlorite.

However, further studies are required:

- a new test on oxidising solids according to the UN Recommendation on the Transport of Dangerous Goods, Manual of Tests and Criteria, in order to confirm the oxidising properties of calcium hypochlorite;
- validated analytical methods for impurities (including calcium chlorate) in calcium hypochlorite as manufactured;
- validated analytical methods for active chlorine residues and for the relevant metabolite chlorate in drinking water.

These studies must be provided as soon as possible but no later than 6 months before the date of approval to the eCA (Italy).