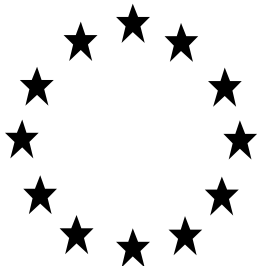
Regulation (EU) No 528/2012 concerning the making available on the market and use of biocidal products

Evaluation of active substances

Assessment Report



Triclosan

Product-type 1
(Human hygiene)

June 2015

Denmark

CONTENTS

1. STATEMENT OF SUBJECT MATTER AND PURPOSE

1.1. Procedure followed

This assessment report has been established as a result of the evaluation of the active substance triclosan in product-type 1 (human hygiene), carried out in the context of the work programme for the review of existing active substances provided for in Article 89 of Regulation (EU) No 528/2012, with a view to the possible approval of this substance.

Triclosan (CAS no. 3380-34-5) was notified as an existing active substance in product-type 1 by Ciba Inc, which during the evaluation was taken over by BASF SE, hereafter referred to as the applicant.

Commission Regulation (EC) No 1451/2007 of 4 December 2007[1] lays down the detailed rules for the evaluation of dossiers and for the decision-making process.

In accordance with the provisions of Article 7(1) of that Regulation, Denmark was designated as Rapporteur Member State to carry out the assessment on the basis of the dossier submitted by the applicant. The deadline for submission of a complete dossier for triclosan as an active substance in Product Type 1 was 31 July 2007, in accordance with Annex V of Regulation (EC) No 1451/2007.

On 30 July 2007, DK competent authorities received a dossier from the applicant. The Rapporteur Member State accepted the dossier as complete for the purpose of the evaluation on 31 October 2007.

On 8 April 2013, the Rapporteur Member State submitted to the Commission and the applicant a copy of the evaluation report, hereafter referred to as the competent authority report.

In order to review the competent authority report and the comments received on it, consultations of technical experts from all Member States (peer review) were organised by the Agency. Revisions agreed upon were presented at the Biocidal Products Committee and its Working Groups meetings and the competent authority report was amended accordingly.

1.2. Purpose of the assessment report

The aim of the assessment report is to support the opinion of the Biocidal Products Committee and a decision on the approval of triclosan for product-type 1, and, should it be approved, to facilitate the authorisation of individual biocidal products. In the evaluation of applications for product-authorisation, the provisions of Regulation (EU) No 528/2012 shall be applied, in particular the provisions of Chapter IV, as well as the common principles laid down in Annex VI.

For the implementation of the common principles of Annex VI, the content and conclusions of this assessment report, which is available from the Agency web-site shall be taken into account.

However, where conclusions of this assessment report are based on data protected under the provisions of Regulation (EU) No 528/2012, such conclusions may not be used to the benefit of another applicant, unless access to these data for that purpose has been granted to that applicant.

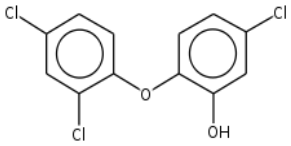
[1] Commission Regulation (EC) No 1451/2007 of 4 December 2007 on the second phase of the 10-year work programme referred to in Article 16(2) of Directive 98/8/EC of the European Parliament and of the Council concerning the placing of biocidal products on the market. OJ L 325, 11.12.2007, p. 3

2. OVERALL SUMMARY AND CONCLUSIONS

2.1. Presentation of the Active Substance

2.1.1. Identity, Physico-Chemical Properties & Methods of Analysis

Identification of the active substance

CAS-No.	3380-34-5
EINECS-No.	222-182-2
IUPAC Name	5-Chloro-2-(2,4-dichlorophenoxy)-phenol
CAS Name	Phenol, 5-chloro-2-(2,4-dichlorophenoxy)-
Molecular formula	$C_{12}H_7Cl_3O_2$
Structural formula	
Molecular weight	289.6 g/mol
Purity (%w/w)	≥ 970 g/kg

The impurities of the active substance are considered as confidential information and, hence, are given in the confidential annex, where the method of manufacture is also described.

Identification of the product

Trade name	Hand soap product
Manufacture's development code number(s)	Not available
Active substance	Triclosan
Function of preparation	Disinfectant
Physical state of preparation	Liquid
Nature of preparation	Ready-to-use formulation

Detailed qualitative and quantitative composition of the Hand Soap product, including identity, content and function of non-active ingredients, is reported in the confidential annex of the dossier.

Physico-Chemical Properties

The pure triclosan is a white crystalline powder with a weak aromatic odour. The melting point is 56.4 °C. Its relative density is 1.55 at 22 °C.

The vapour pressure is found to be 3.0×10^{-4} Pa at 20 °C (extrapolated). A data gap has been identified for the water solubility and partition coefficient endpoints and would still be required. Triclosan is soluble in organic solvents.

The exothermal decomposition of triclosan starts at 253 °C. Triclosan is not highly flammable. It has no pyrophoric property, does not evolve any flammable gases in contact with water or humid air and has no self-ignition at temperatures up to its melting point. Triclosan is not explosive and not oxidizing based on molecular structure properties.

The recommended container materials for triclosan are food grade PE Inliner used for primary packaging, and LDPE liner in fibre drum used as standard packaging. Coated steel drums are assumed to work as well but have not been tested. Not recommended, though not demonstrated to cause problems, are uncoated steel drums, fibre drums without inliners, wooden packages or simple paper bags.

Analytical methods

The identification and quantification of triclosan as manufactured is performed using the capillary gas chromatography using flame ionisation detector. Methods of analysis for residues are gas chromatography or gas chromatography using mass selective detection (GC-MSD).

Acceptable validation data for the methods to analyse residues in soil and water was not submitted and, if the active substance is approved, must be provided at a later stage. The new method on soil was accepted, however adequate validation data must be provided if the active substance is approved. Similarly, the method on water would need to be validated to comply with the requirements for LOQ for surface- and drinking water according to the ECHA guidance on information requirements (July 2013).

Due to the vapour pressure of triclosan and the intended use of the biocidal product it is not likely that triclosan will become airborne. A method for residues in air is therefore not required.

No analytical method for the determination of residues of triclosan in animal and human body fluids and tissues was submitted. However, it is not required because the active substance is not classified as toxic or very toxic.

No analytical method for the determination of residues of triclosan in/on food or feedstuffs was submitted. However, it is not required because the active substance is not used in a manner that may cause contact with food or feedstuffs.

Analysis of five technical grade batches which are representative of the current manufacturing process demonstrated a mean purity of 970 g/kg in compliance with BASF SE specifications. All impurities above the level of 1 g/kg have been fully identified and the corresponding methods of analysis have been developed. The main identification characteristics are given in the Confidential Annex. The evaluation has established that for the active substance notified by Ciba Inc. none of the manufacturing impurities are considered to be of potential concern.

2.1.2. Intended Uses and Efficacy

Triclosan is a bactericidal active ingredient for use in liquid soap formulations for hand disinfection. Triclosan may also have virucidal and fungicidal activity. However, if the active substance is approved, full efficacy against these organisms or other organisms claimed should be demonstrated at product authorisation.

The representative product for which the exposure and risk characterisation is presented in this dossier contains 0.7% triclosan by weight. This triclosan-containing bactericidal soap is only intended for use by special professional health care personnel of e.g. surgical operations. Soaps are designed and used as rinse-off products. Both hands and forearms are washed with soap and water; the suds are left on skin for approximately 1 minute and then rinsed off with tap water.
The assessment of the biocidal activity of the active substance demonstrates that it has a sufficient level of efficacy against potentially harmful bacteria, e.g. *Staphylococcus aureus, Staphylococcus epidermitis, Enterococcus hirae, Escherichia coli, Pseudomonas aeruginosa* and *Enterococcus faecalis.* Disinfectants containing triclosan may also have virucidal and fungicidal activity.

Triclosan has been the most studied biocide with respect to its anti-bacterial activity. Low concentrations of triclosan can trigger the expression of resistance and cross-resistance mechanisms in bacteria in vitro. However, investigations concerned mainly laboratory experiments and only very few studies are available to date on bacterial resistance to Triclosan in situ. Thus additional in situ information is needed to provide a definitive opinion.

In February 2015 two new tests were submitted by the Applicant with a Triclosan concentration of 0.1%, but the Efficacy WG in March 2015 concluded that sufficient efficacy was not demonstrated. Efficacy was demonstrated only for gram-positive bacteria and not against gram-negative bacteria, which was considered insufficient for active substances used in disinfectants. In this case the efficacy should have been demonstrated for at least the representative bacteria in the EN Phase 1 test.

The intended uses of the substance, as identified during the evaluation process, are listed in Appendix II.

2.1.3. Classification and Labelling

The current classification and labelling of the active substance triclosan according to Annex VI of Council Regulation (EC) No. 1272/2008, index no. 604-070-00-9 and Annex I of Council Directive 67/548/EEC, index no. 604-070-00-9, is shown in Tables 1.5-1a and b.

Table 1.5-1a: Current classification / labelling of triclosan according to Reg. (EC) No. 1272/2008

Indication of danger:	Eye Irrit. 2 Skin Irrit. 2 Aquatic acute 1 Aquatic chronic 1
Pictogram and signal word:	GHS07 GHS09 Warning
Hazard statement:	H319 Causes serious eye irritation H315 Causes skin irritation H400 Very toxic to aquatic life H410 Very toxic to aquatic life with long lasting effects
Precautionary statement:	P264; P280; P350 + P351 + P338; P273; P391; P501
Environmental M-factor for aquatic acute and chronic category	M = 100
Justification:	Concerning the physico-chemical properties, the active substance triclosan does not fulfil the criteria for a classification according to regulation (EC) No 1272/2008. Therefore no labelling is required for physico-chemical hazards. Triclosan is irritating to eyes and skin and very toxic to aquatic organisms. It may cause long-term adverse effects in the aquatic environment. With regard to its toxicological and ecotoxicological properties, the active substance is classified as irritant and dangerous for the environment and has to be labelled with the hazard statements H315, H319, H400, H410.

Table 1.5-1b: Current classification / labelling of triclosan according to Dir. 67/548/EEC

Hazard symbol:	Xi, N
Indication of danger:	Irritant Dangerous for the environment
R-phrases:	R36/38: Irritating to eyes and skin. R50/53: Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S-phrases:	S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S39: Wear eye/face protection. S46: If swallowed, seek medical advice immediately and show this container or label. S60: This material and its container must be disposed of as hazardous waste. S61: Avoid release to the environment. Refer to special instructions/Safety data sheets.
Justification:	Concerning the physico-chemical properties, the active substance triclosan does not fulfil the criteria for a classification according to Council Directive 67/548/EEC. Therefore no labelling is required for physico-chemical hazards. Triclosan is irritating to eyes and skin and very toxic to aquatic organisms. It may cause long-term adverse effects in the aquatic environment. With regard to its toxicological and ecotoxicological properties, the active substance is classified as irritant and dangerous for the environment and has to be labelled with the hazard symbols Xi and N and the R-phrases R36/38-50/53.

No changes are proposed in the classification and labelling.
It should be noted that a concern for inhalation toxicity of triclosan has been raised by the National Industrial Chemicals Notification and Assessment Scheme (NICNAS, 2009) under the Australian Government[2]. Based on the results of a 21-day rat inhalation study in which a mixture of triclosan and ethanol was tested, the following classification was proposed for triclosan: R23, toxic by inhalation and R37, irritating to the respiratory system according to the dangerous substances regulation 67/548/EEC or Acute tox. 3, H330: Toxic if inhaled and STOT SE 3, H335: May cause respiratory irritation according to the CLP regulation (EC) No 1272/2008. This inhalation toxicity is considered to represent a mixture effect for the ethanol formulation. Triclosan is a crystalline powder, and as such physically different from the solution in ethanol. The inhalation study was not submitted in relation to the a.s. evaluation. Because triclosan was tested in a mixture with ethanol in this study it is not considered relevant for the classification of triclosan.

[2] http://www.nicnas.gov.au/publications/car/pec/pec30/pec_30_full_report_pdf.pdf

2.2. Summary of the Risk Assessment

2.2.1. Human Health Risk Assessment

2.2.1.1. Hazard identification

Pharmacokinetic data in hamsters indicate that triclosan is well-absorbed following oral administration. Oral absorption in rats is 70 %. Two C_{max} values are seen in mice and rats (at 1 and 4 hours), indicating enterohepatic recirculation, which does not occur in hamsters or humans. In hamsters, the C_{max} has been reported to occur after 1 hour following administration of the dose of triclosan.

Regardless of the formulation, only trace amounts of the parent compound are detected in the plasma following exposure to triclosan-containing products. Due to a pronounced first-pass effect, there is a near total conversion of absorbed triclosan to glucuronic and sulphuric acid conjugates. The half-life of elimination for orally administered triclosan was reported to range from approximately 14 hours (single dose) to 20 hours (repeated doses).

Following ingestion, percutaneous application, or intravenous administration in humans, the predominant route of excretion of triclosan is through the urine, where triclosan is present as the glucuronide conjugate. In contrast, triclosan excreted in the faeces is present as the free unchanged compound. Pharmacokinetic data indicate a lack of bioaccumulation potential.
The metabolism of triclosan is similar between rodents and humans. In all species tested, the formation of glucuronide and sulphate conjugates predominates, with the relative extents to which glucuronide and sulphate conjugates are formed varying with the type of dosing (i.e., single-dose versus repeated doses) and with species under study. The excretion of triclosan in hamsters, primates, and humans is primarily via the urine, while excretion is primarily faecal in both mice and rats.

Absorption through human skin preparations *in vitro* was investigated with ^{14}C-triclosan in various formulations representing relevant consumer products. A soap formulation was tested among others. The soap solution was left on the skin sample for 10 minutes which simulates a typical rinse-off situation. For the soap solution (0.02% triclosan), a dermal absorption of 13% was determined (including the amount found in skin except the top layers of the stratum corneum and corrected for recovery). For the present formulation, the dermal absorption determined for a soap solution is considered the most relevant. Therefore, the dermal absorption of 13% is taken forward to the risk assessment.

Acute toxicity: The oral and dermal LD_{50} values in the rat and rabbit are greater than 2000 mg/kg body weight. These data indicate that triclosan is not acutely toxic to animals *via* the oral or dermal routes of administration.

Triclosan is neither volatile (vapour pressure 3×10^{-4} Pa at 20°C) nor are respirable aerosols generated during the application of the present formulation. Inhalation toxicity studies were therefore not conducted.

However a 21-days repeated dose inhalation study evaluated by the SCCP and the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) under the Australian Government, gave rise to the risk phrases R23 and R37 when testing in mixture containing ethanol. RMS however considers that classification for inhalation toxicity is not relevant.

In its pure form triclosan is irritating to skin and eyes, whereas the low concentrations used in personal hygiene products do not pose an irritant hazard.

Triclosan is not sensitising to skin according to a guinea pig maximisation test and a modified Buehler test with nine induction treatments.
Following repeated dermal administration, no systemic effects were seen in the GLP-compliant 90-day toxicity study in rats. The NOAEL for systemic effects of dermally administered triclosan is 80 mg/kg bw/day, which was the highest dose tested.

Hepatic effects were marked in mice, and included biochemical changes measured in blood or plasma, liver weight changes, and histopathologic changes. In contrast, liver changes were seen less frequently and with decreased severity in rats and hamsters.

Hamsters showed significant morphological effects on and reduced numbers of spermatozoa and germ cells in both sub-chronic and chronic/carcinogenicity studies. However, the hamsters in the high dose group of the chronic study had a very high mortality and a generally poor condition and in the short term hamster study the same effects on the reproductive parameters were seen in all groups including the control group. Hamsters are seasonal breeders and undergo spontaneous regression of testicular tissue when conditions are suboptimal for breeding. It is therefore probable that the change seen in hamsters stems from the suppressed state or of the poor condition of the animals and a classification is therefore not suggested.

The critical effects of triclosan in rats were determined in a two-year carcinogenicity study. NOAEL was determined to be 40 mg/kg bw/day based on reduced WBC counts in ♀ and increased clotting time/decreased monocyte count in ♂.

The results of repeated-dose toxicity studies indicate that the mouse demonstrated sensitivity to hepatic effects of triclosan that was not observed in rats or hamsters. Mice showed signs of liver function changes (serum cholesterol changes, increases in liver function enzymes), increased liver weights, hepatocellular hypertrophy, and focal necrosis starting at doses of 25 mg/kg bw/day, whereas rats showed only increased liver weights and mild hepatic cytomegaly at doses of 300 mg/kg bw/day or higher.

It is notable that triclosan induced hepatic cell proliferation in the mouse, but not in the hamster or rat, in investigational studies of replicative DNA synthesis. Taking into account the results from these special investigations, sub-chronic toxicity data indicating an increased sensitivity in mice to triclosan's hepatic effects, and pharmacokinetic data showing greater exposure levels to triclosan in mice compared to rats or hamsters, there is strong evidence that triclosan has peroxisome proliferator effects in mouse liver, but not in rat or hamster liver. Given the association of peroxisome proliferation, cell proliferation, and tumour induction reported in the mouse, but no effects of these types in rats and hamsters, it was concluded that the mouse is uniquely sensitive to triclosan in the liver.

Without any tumours in other tissues, with the detection of liver tumours in mice only, and the establishment of peroxisome proliferation as inducer of liver tumours in mice, triclosan is presumed to be of no substantive cancer risk to man.

Triclosan was negative in the standard battery of genotoxicity assays and did not produce tumours in the rat or the hamster.

For developmental toxicity, NOAELs of 50 mg/kg bw/day were concluded from studies in rats and rabbits based on maternal effects. In rats, foetal effects (foetal variations) were manifest as delayed ossification at the high dose of 150 mg/kg bw/day, and with maternal toxicity occurring at the same dose. Based on observations of delayed ossification at the high dose, the foetal NOEL in this study was determined to be 50 mg/kg bw/day. No foetal effects were noted in the rabbit at doses up to and including 150 mg/kg bw/day.

The NOAEL for pre- and post-natal effects in a 2-generation reproduction study in rats was determined to be 76 mg/kg bw/day based on a slight decrease in mean foetal body weights and a slight decrease in the Day 0 to Day 4 survival in the F1 generation at the highest dose.
The overall evaluation of the reproductive effects of triclosan should be performed in REACH substance evaluation when assessing possible endocrine disruption. The data submitted for this registration is not sufficient on this matter and there is a growing number of studies from the open literature showing potential problems with triclosan concerning endocrine disruption.

Low maternal serum thyroxine during gestation has previously been demonstrated to correlate

with four- to 10-point IQ deficit in children (Haddow et al. 1999) and laboratory studies have documented that triclosan disrupts thyroid systems in frogs and juvenile rats (Crofton et al., 2007; Veldhoen et al., 2006; Zorilla et al., 2009). Furthermore, triclosan has recently been shown to elicit reproductive toxicity in adult rat and fetal toxicity in offspring exposed in utero, during lactation and after weaning (Rodriguez and Sanchez, 2010). In this study a significant decrease in sex-ratio of the pups was observed (less male pups) along with significantly reduced pup weight at postnatal day 20 in all treated animals. Moreover, vaginal opening was significantly delayed after exposure to triclosan at all tested doses (1, 10 and 50 mg/kg/day). Finally, results demonstrated a dose-related decrease in the live birth index and in the 6-day survival index in the group receiving 50 mg/kg/day.

Triclosan has also recently been reported to suppress steroidogenesis in the rat (Kumar et al., 2009), and the compound has been found in human milk at concentrations up to 2.1 mg/kg-lipid (Dayan, 2007).

A scientific and regulatory review of triclosan is currently being conducted by the U.S. Food and Drug Administration (FDA) in collaboration with the U.S. Environmental Protection Agency (EPA). FDA is reviewing FDA-regulated products and EPA is specifically studying the potential endocrine disrupting effects of triclosan. (US FDA, 2010; US EPA, 2010; Cooney, 2010). Parts of the study have already resulted in publications. These publications are summarised in the following:

In a study by Stoker et al. (2010), triclosan was found to affect oestrogen-mediated responses in the pubertal and in the weanling female rat and also to suppress thyroid hormone in both studies. Lowest effective concentrations were found to be approximately 10 (for oestrogen) and 40 (for thyroid hormone) times higher than the highest concentrations reported in human plasma.
Paul et al. (2010) suggested that the mode of action of triclosan-induced decrease in thyroxine in rats may be partially due to upregulation of hepatic catabolism based on a 4-day study in weanling female Long-Evans rats.

Furthermore, Paul et al. (2010b) exposed pregnant Long-Evans rats to triclosan from gestational day 6 through postnatal day 21 and obtained serum from pups and dams. Serum thyroxine was reduced approximately 30 % in pups on postnatal day 4 but no effects were observed at postnatal days 14 and 21. The authors suggest that toxicokinetic or toxicodynamic factors may have contributed to a reduced exposure or a reduced toxicological response during the lactation period.

Based on the above, triclosan must be considered to be a suspected endocrine disrupting compound.

Triclosan will also be subject to further evaluation under REACH where it has been included on the Community Rolling Action Plan (CoRAP) and is under substance evaluation (REACH Article 44-48). The substance evaluation started in 2012 and is targeted to two identified areas of concern: PBT and endocrine disruption. The Netherlands is lead country with Denmark as co-rapporteur. Based on this development it is appropriate to postpone the assessment of this issue until the evaluation under REACH has been finalised.

2.2.1.2. Effects assessment

With reference to the discussion of the most relevant long-term NOAEL in doc IIC section 1.2.2.1, the long-term AEL is derived from the 2 year oral rat study ([redacted], 1986) with a NOAEL of 40 mg/kg/day.

The acute AEL is derived from the 13 weeks oral rat study ([redacted], 1983), as the 28 day mouse ([redacted], 1987) and 28 day baboon studies ([redacted], 1969) are not deemed suitable to derive the acute AEL from, e.g. on basis of the argumentation in doc IIC section 1.2.2.1.

$AEL_{medium\text{-}term}$ is based on the 13 week rat study as well.

The overall assessment factor (AF) for all durations is 100 (interspecies × intrapecies). No adaption to the exposure duration is required.

The oral absorption of triclosan in rats is 70 %, as determined in the available toxicokinetic studies. Thus, a correction for oral bioavailability of triclosan needs to be applied to the reference values.

Dermal absorption was investigated in a human skin preparation *in vitro* study on a soap solution (0.02% triclosan), for which a dermal absorption of 13% was determined (including the amount found in skin except the top layers of the stratum corneum and corrected for recovery).

The AEL is calculated as follows:

AEL_{acute} = $NOAEL_{medium\text{-}term,\ rat}$ × oral absorption / AF
= (65 mg/kg bw/day × 70%) / 100
= **0.455 mg/kg bw/day**

$AEL_{medium\text{-}term}$ = $NOAEL_{medium\text{-}term,\ rat}$ × oral absorption / AF
= (65 mg/kg bw/day × 70%) / 100
= **0.455 mg/kg bw/day**

$AEL_{long\text{-}term}$ = $NOAEL_{chronic,\ rat}$ × oral absorption / AF
= (40 mg/kg bw/day × 70%) / 100
= **0.28 mg/kg bw/day**

2.2.1.3. Exposure assessment

Primary exposure: The exposure resulting from daily hand-washing procedures was calculated using a modified scenario of ConsExpo 4.1 assuming a body weight of 60 kg and a dermal absorption of 13 %. The use frequency is 10 and 4 uses per day. The representative antimicrobial soap contains 0.7 % triclosan.

The only relevant route of primary exposure is the dermal route. The estimated chronic systemic exposure of a professional user is 0.531 mg/kg bw/day and 0.212 mg/kg bw/day, following 10 and 4 uses per day, respectively.

Exposure via breast milk: In a recent publication by Dayan (2007), a risk assessment based on triclosan levels measured in human milk from Breast Milk Banks in California and Texas is presented. The mean of the concentrations in the 5 samples with the highest levels was calculated for use in the risk assessment – triclosan 1742 µg/kg lipid, corresponding to 35.8 µg/kg whole breast milk. A daily milk consumption of 207 g/kg bw/day was assumed to represent a value covering 97.5% of the population.

The maximum calculated daily triclosan consumption is:

$$\mathbf{I_{BM}} = 35.8\ \mu g/kg\ milk \times 207\ g/kg\ bw/day = \mathbf{7.4\ \mu g/kg\ bw/day}$$

2.2.1.4. Risk characterisation

Exposure to triclosan from personal hygiene products is not limited to a specific season of the year. Exposure of health care professionals can occur throughout their entire occupational life.

Primary exposure: The estimated **chronic systemic exposure** of a professional user is

0.531 mg/kg bw/day and 0.212 mg/kg bw/day, following 10 and 4 uses per day, respectively.

In table 2.1 the calculated systemic exposure and the corresponding MoE and %AEL values are summarized.

Table 2.1. Risk characterisation of systemic exposure.

Exposure Frequency	Calculated systemic exposure to triclosan	MoE*	% AEL
10 uses per day	0.531 mg/kg bw/day	53	190
4 uses per day	0.212 mg/kg bw/day	132	76

* Adjusted for 70% oral absorption (i.e. ((40 mg/kg * 70%)/100)/0.531 mg/kg)

An unacceptable risk is identified at 10 uses per day as the exposure exceeds the AEL and as an adequate MoE has not been established.

However, at 4 uses per day an acceptable exposure is established. The application is therefore of acceptable risk for human health.

Exposure via breast milk: A NOAEL for triclosan in breast milk cannot be directly defined because the triclosan intake of nursing pups in a two-generation study is not known. The NOAEL for post-natal development (slight decreases in mean foetal body weights and in Day 0 to Day 4 survival) was 76 mg/kg bw/day based on F1 maternal intake.

The estimated triclosan intake from breast milk is 7.4 µg/kg bw/day. The MoE to the NOAEL is 76,000 / 7.4 = 10,270 which suggests that triclosan concentrations encountered in mother's milk do not lead to critical systemic exposures.

It is however recommended that exposure of pregnant and nursing women to triclosan must be avoided to reduce the risk of exposure of infants to triclosan via breast milk.

2.2.2. Environmental Risk Assessment

2.2.3. Fate and distribution in the environment

Hydrolysis as a function of pH

Considering the high hydrolytic stability determined under stringent temperature conditions (25 and 50 ºC) and at different pH values (4, 7 and 9) it is not expected that hydrolytic processes will contribute to the degradation of triclosan in the aquatic systems.

Photolysis in water

Triclosan has a dissociation constant in water of pKa = 8.14, i.e., depending on the pH of the test medium the compound's occurrence is predominantly as an anion in alkaline milieu or in the molecular form at pH values below the pKa. The importance and kind of photochemical reaction (direct photolysis) is coupled with this characteristic of triclosan. The transformation of the anionic form (pH of the aqueous solution > pKa) under sunlight is expected to be faster than the transformation of the molecular form. However, experimentally determined half-lives are low in either case, amounting to 41 minutes for pH 7 and to 15 to 26 minutes for pH 8.6. Environmental half-lives have also been calculated for different surface waters in central Europe, and indicates a half-lives from lower than 10 days in the summer to more than 90 days in winter. The route of photochemical degradation is also dependent on the pH of the

aqueous medium. If the compound is mainly present in the molecular form, triclosan´s photodegradation proceeds via a nearly quantitative transformation into 2,4-dichlorophenol. By contrast, the anion's degradation leads to the formation of 2,8-dichlorodibenzo-p-dioxin (DCDD) (12% at maximum). Additionally, for DCDD a conversion rate of 1% is reported and estimated half-lives suggest that it is photolabile as well (Aranami et al. (2007). The photochemical degradation kinetics of DCDD in wastewater is also reported by Sanchez-Prado et al. (2006). Thus under laboratory conditions it was possible to demonstrate the formation of 2,8-DCDD from Triclosan, which was shown to be as photolabiles as Triclosan itself, indicating that the substance is not regarded as persistent under testing conditions.

Although photodegradation seems to be a major degradation patway of Triclosan in surface waters, it seems that 2,8-DCDD only appears temporarily during the photodegradation process of Triclosan as a non-stable metabolite and, therefore, not seems to be a significant metabolite under real environmental conditions. There seems no general link between the photooxidation of Triclosan and the production of 2,8-DCDD and other Dioxines. Furthermore, the formation of dioxins from Triclosan present in river sediments is unlikely due to the absence of UV-light reaching the sediment. As the formation of 2,8-DCDD which was reported in a phptolysis study seems to be performed under unrealistic conditions it is suggested to request further informations e.g. a modified version of OECD 316 where the focus is put on the determination of 2,8-DCDD and other dioxins and less focus to determine phototransformation kineticts (this mean that the concentration limit of 10% normally applied in this guideline should be much lower for 2,8-DCDD and other dioxin, as low as technical possibly), with the purpose to clarify the concern of the formation of any metabolite, specifically a dioxin-like substance like 2,8-DCDD.

Direct phototransformation processes contribute to the overall dissipation of triclosan in surface water bodies especially for the ionized form and under alkaline conditions.

As the PBT properties of triclosan with its degradation products (including photodegradation of triclosan) will be subject to further evaluation under REACH where it has been included on the Community Roling Action Plan (CoRAP) and will undergo substance evaluation it is appropriate to postpone this issue until the evaluation under REACH has been finalised.

Photolysis in air

The tropospheric half-life of triclosan was estimated using the software programme AOPWIN, v. 1.91, US-EPA 2000. The program is based upon QSAR methods developed by Dr. Roger Atkinson and co-workers. The half-life of triclosan in the troposphere was calculated to be 23.9 hours with a degradation rate of 16.1147×10-12 cm3 × molecule-1 × s-1. This corresponds to a chemical lifetime in air of 0.996 days. These estimations were carried out with respect to the OH radical reaction, only, and using a 24-hours-day with 5 × 105 OH radicals×cm-3. The calculation indicates a rapid degradation of triclosan when potentially entering the atmosphere. Based on the QSAR calculation, the photochemical half-life of triclosan in the air was estimated to be 1 day. The degradation of triclosan residues by OH-radicals proceeds with a DT50 value of 23.9 hours. Therefore, a transport of triclosan over larger distances or an accumulation in the air is not to be expected.

Biodegradation

Based on a modified Sturm test (OECD TG 301B) and a modified MITI test (OECD TG 301C), triclosan is concluded to be not readily biodegradable. Based on the results of a Zahn-Wellens / EMPA test (OECD TG 302B), the test substance is inherently primary biodegradable (primary biodegradation of triclosan was 99.4% after 14 days) but as ultimate biodegradation and degradation products were not investigated, it does not formally fulfil the criteria. Based on all available biodegration studies and monitoring studies triclosan is consider as inherently

biodegradable for the PEC calculation. However, this approach will only be used for the PEC calculation but not for the PBT assessment. For the evaluation of the P criteria in connection with the PBT or vP assessment we should wait for the results from the substance evaluation for triclosan, including its transformations products made under REACH (PBT assessment).

Two continuous activated sludge (CAS) studies under aerobic conditions were conducted to give realistic estimates of removal during secondary wastewater treatment. Primary degradation (i.e. converted to metabolites, mineralisation or incorporation into biomass) of triclosan exceeded 94% whereas complete degradation (i.e. mineralisation or incorporation into biomass) exceeded 80% of the dosage in the STP influent. In the other study, a removal of the parent compound of 98.2 to 99.3% (86.8 to 88.8% of applied radioactivity) was observed and was independent of the concentration in the STP influent. Triclosan is removed to a large extend in STPs and to a large extend also mineralised to CO2. Monitoring data of STP in influent and effluents (see above) demonstrates that triclosan is extensively degraded and removed in activated-sludge systems. The monitoring data on the other hand also demonstrates that triclosan still is released and is ubiquitous in the aquatic environment. High overall removal rates in activated sludge wastewater treatment plants of approximately 75-99% were observed in monitoring studies (geometric mean= 94.05 %). However, lower removal rates were observed in wastewater treatments plants with trickling filters (58-97 %) (Halden and Paull 2005, Bester 2005, Sabaliunas et al. 2003, Schatowitz 1999, McAvoy et al. 2002, Thomas and Foster 2005 and Thompson et al. 2005). The measured concentrations of triclosan in STP effluents were in the range 2 to 1100 ng/L in Europe. Three publications indicate, that methyl-triclosan could be a degradation product formed during treatment of triclosan containing influents in STPs. However, measured residues of the metabolite – if the breakdown product could be detected at all – were low. STP-effluents contained maximum residues of 11 ng/L (Switzerland) and 19 ng/L (Germany). Maximum concentrations found in surface waters amounted to 2 ng/L (Switzerland) and approx. 5 ng/L (Germany). A number of effluent and surface water samples did not contain methyl-triclosan above the limit of quantification.Triclosan deposited rapidly in sediment in a water/sediment studies. In the sediment, the parent compound was degraded slowly with DT50 values of 56 days. When normalised to 12 °C, this corresponds to 106 days. Corresponding dissipation half-lives for the total system were 41 (river) and 58 (pond) days. This corresponds to 78 days (river) and 110 days (pond) when normalised to 12 °C (TGD, 2003). Degradation of 14C-triclosan in both compartments proceeded via formation of numerous minor metabolites, one of which was identified as methyl-triclosan (In the water phase methyl-triclosan was not detected or below the limit of detection after 104 days. In the sediment the concentration of methyl-triclosan was rising during the study up to a maximum value of 4.8% after 104 days) , to formation of high amounts of bound residues (32.4- 33 %); however only limited mineralization was seen (radioactive carbon dioxide 21-29 %).

In two aerobic soil degradation studies, the half-lives vary from 4.7- 99.6 days at 12 °C and a geometric mean of 19.3 days, n=6 has been used for the Risk assessment. However, the two studies give half-lives that differ by a factor of 10. Temperature and moisture condition seems to play an important role in the biodegradation of triclosan, with a lack of significant biodegradation under colder and wet conditions. The degradation of 14C-triclosan in soil incubated under aerobic conditions proceeds primarily via the formation of methyl-triclosan and significant amounts of bound residues (max. 76% at study termination). The half live of methyl-Triclosan in aerobic soil was 96.7 days in sandy loan, 153 days in clay loam and 39.2 days in loam at 20 °C, respectively. Recalculated to 12 °C the half-lives for methyl-triclosan were 183, 290 and 74 days and a geometric mean of 158 days. These results indicate that methyl-triclosan is more persistent than the parent compound.

No evidence for the biodegradation of triclosan under anaerobic conditions was observed.

Mobility

The investigation of triclosan mobility in the soil compartment is considered as not relevant due to the exclusive indoor use-pattern and the proposed use of the product. Based on adsorption/desorption studies (screening test according to OECD Test Guideline 121) results in

a Koc value for the adsorption of 831.8, i.e. log.Koc 2.9, indication a low potential for translocation into deeper soil layers or even ground water; however, QSAR indicate a significantly higher Koc value (a Koc of 8417 L/kg; log Koc = 3.9). The esperimental date of a Koc value of 831.8, i.e. log.Koc 2.9 will be used for the Risk assessment

In the same way, the adsorption coefficient of the potential triclosan metabolite triclosan-methyl was determined. A Koc value of 416.9 was obtained based on the HPLC screening test and a log Koc of 4.07 based on QSAR was obtained. The Koc of 416.9 based on the HPLC screening test was used for the RA, .

Bioaccumulation

Triclosan has a log Kow value of 4.8 and may therefore accumulate in organisms. Two studies with zebra fish (Brachydanio rerio) confirm this assumption with Bioconcentration Factor (BCF) values between 2532 and 8700. However, the BCF varies strongly with the test conditions and triclosan is rapidly eliminated after termination of the exposure.

Based on the data presented above for triclosan in aquatic organisms, it is concluded that triclosan may meets the vB criterion (BCF higher than 5000) as set out in REACH. It is, however, recognized that the wide range of BCF values in fish (from 2532 to 8700), raises some uncertainty regarding the actual bioaccumulation potential of triclosan.

In the scope of a monitoring study, the BCF of methyl-triclosan, a transformation product, was determined to be in the range of triclosan. Assuming an average fat content in fish of 2%, the bioconcentration factor for methyl-triclosan on a wet weight basis (BCFW) was estimated to be 2000-5200 L kg-1.

It is recognized that the wide range of BCF values in fish (from 2532 to 8700), raises some uncertainty regarding the actual bioaccumulation potential of triclosan. Therefore, the exact value used for the PBT or vB assessment should await the results from the substance evaluation for triclosan, including its transformations products made under REACH (PBT assessment). However, at WGV 2014 it was decided to use the BCF values provided in the [redacted] (2000) study for the relevant environmental pH range which is 8150 (pH7) to 8700 (pH 6).

2.2.4. Effects assessment

Surface water compartment

Long-term toxicity studies with fish (*Oncorhynchus mykiss*), Daphnia (*Ceriodaphnia dubia*) and algae (*Desmodesmus subspicatus*) exposed to triclosan are available resulting in NOECs of 34.1 µg a.s./L, 6 µg a.s./L and 0.50 µg a.s./L, respectively. According to the TGD (EC, 2003), an assessment factor of 10 can be applied to the most sensitive endpoint for the calculation of the PNECwater. Thus, a PNECwater value of 0.05 µg a.s./L is obtained for the risk characterisation. Additionally, the applicant suggested a PNECsurface water based on the HC5,50 value derived from 15 chronic NOEC or EC10/20 values, respectively. The suggestion was refused at WGV 2014, however, it is recognized that a lot of new studies have been conducted on a "popular" substance such as triclosan, during the last years (several new studies is published every year). It was therefore discussed to increase the NOEC value, based on weight of evidence; however, at the WGV 2014 it was decided to use the NOEC of the algae study to derive the PNEC in water.

Metabolites of triclosan possibly formed in the aquatic environment are not considered further for effects assessment in the aquatic compartment, since they appear in low amounts and provided to be much less ecotoxic than triclosan itself. However, at the WG meeting (WG V 2014) it was decided that an environmental risk assessment of methyl-triclosan (MTCS) should be performed for the terrestrial compartment and the PNEC soil should be derived from

the PNEC aquatic using the EPM method. The alga is the most sensitive trophic level from the aquatic acute data set (fish, Daphnia, algae) and a ErC50 value of 0.17 mg/l will be used for the risk assessment.

Sediment

A 28d-NOEC > 100 mg a.s./ dry kg is available for larvae of the midge Chironomus riparius, which was used for the PNEC derivation. As only one long-term test is available, an assessment factor of 100 is used resulting in a PNECsed of 1 mg a.s./kg (dry), corresponding to 0.988 mg/kgwwt when normalised to 10% o.c. (local).

Terrestrial compartment

NOEC values are available for soil microorganisms, earthworms, terrestrial plants and predatory mites. An assessment factor of 10 is applied to the lowest NOEC obtained in the chronic predatory mite study. Resulting in a PNECsoil of 0.13 mg a.s. /kg dry weight soil, corresponding to 0.115 mg/kg wwt.

For Methyl triclosan the effects assessment of the soil compartment, is based on the PNECfreshwater using the EPM method.

The PNECfreshwater is 0.00017 mg/L (using an AF of 1000). Henry LC of 0.287 (EPIWIN),; Water solubility of 0.4044 mg/L (EPIWIN) and a Koc of 417, (based on the study by Konrad 2006)

The PNECsoil is 0.00127 mg a.s./kg wwt soil, based on EPM method.

STP compartment

According to the TGD (EC, 2003), and taking into account the only test available with aquatic microorganisms performed according to OECD TG 209 with activated sludge, an assessment factor of 100 can be applied to the resulting EC50 of 11 mg a.s./L. Thus, a PNECmicroorganisms of 0.11 mg a.s./L is derived.

Non-compartment specific effects relevant to the food chain (secondary poisoning)

A short-term dietary study with the bobwhite quail (Colinus virginianus) resulted in a LC50 > 5000 mg a.s./kg food. Applying an assessment factor of 3000, the PNECoral, birds is calculated to be 1.67 mg a.s./kg food.

For mammals, a NOAEL of 65 mg/kg bw/day was obtained from a 90 days feeding studies with rats. Applying an assessment factor of 20 to the calculated NOEC of 1300 mg a.s./kg food, a PNECoral of 14.4 mg a.s./kg food is derived.

Because birds are more sensitive predators than mammals, the PNECoral for birds is used in the risk characterisation.

2.2.5. PBT and POP assessment

A preliminary PBT assessment is carried out for triclosan according to the REACH guidance on PBT assessment. However, as triclosan and its metabolites will be subject to further evaluation

under REACH where it has been included on the Community Roling Plan (CoRAP) and will undergo substance evaluation and is targeted to two identified areas of concern: PBT and endocrine disruption a further evaluation on these two properties will await the final evaluation under REACH.

Persistence criteria (P)

A screening on basis of QSAR predictions shows that the substance is potentially persistent. This assessment conform to the data on ready biodegradability, where triclosan is considered not readily biodegradable and show limited mineralization. An inherent test shows that triclosan is primary biodegradable; however, as ultimate biodegradation and degradation products were not investigated, it does not formally fulfil the criteria

Triclosan deposited rapidly in sediment in water/sediment studies. A mean dissicipation half live of about one day was calculated for both the river and pond water phases. In the sediment, the parent compound was degraded more slowly with DT50 values of 56 days for both aquatic systems. When normalised to 12 °C, this corresponds to 106 days. Corresponding dissipation half-lives for the total system were 41 (river) and 58 (pond) days. This corresponds to 78 days (river) and 110 days (pond) when normalised to 12 °C (TGD, 2003). Degradation of 14C-triclosan in both compartments proceeded via formation of numerous minor metabolites, one of which was identified as methyl-triclosan, to formation of high amounts of bound residues (32.4- 33 %); however only limited mineralization was seen (radioactive carbon dioxide 21-29 %). The concentration of the major metabolite methyl-triclosan was rising during the study (highest amount of 4.8% on day 104 in river system, sediment extract). All of the other metabolite reached highest 6.5% of the applied radioactivity in the water phases or sediment or both systems.

Photolysis also occurs for triclosan; however only for the ionized form and this only occurring in significant amounts at slightly alkaline conditions in shallow waters and the upper water layers.

As an overall result it can be concluded that triclosan is removed in the aerobic aquatic systems. However, monitoring data underlines that triclosan is ubiquitously present in the aquatic environment.

In two aerobic soil degradation studies, the half-lives vary from 4.7- 99.6 days at 12 °C and a geometric mean of 19.3 days, n=6 has been used for the Risk assessment. However, the two studies give half-lives that differ by a factor of 10. The difference is not attempted explained by the applicant. Temperature and moisture condition seems to play an important role in the biodegradation of triclosan. The degradation of 14C-triclosan in soil incubated under aerobic conditions proceeds primarily via the formation of methyl-triclosan and significant amounts of bound residues (max. 76% at study termination). The half live of methyl-Triclosan in aerobic soil was 96.7 days in sandy loan, 153 days in clay loam and 39.2 days in loam at 20 °C, respectively. Recalculated to 12 °C the half-lives for methyl-triclosan were 183, 290 and 74 days and a geometric mean of 158 days which is over the threshold provided in the Reach guidance dealing with P criterion. These results indicate that methyl-triclosan is more persistent than the parent compound.

Based on the above data for persistence on triclosan and methyl-triclosan, triclosan do not fulfil the P criteria; but methyl-triclosan does; however, further evaluations are necessary.

Bioaccumulation criteria (B)

The bioaccumulation potentials are significant based on a BCF value of 8700. However, the BCF varies strongly with the test conditions (e.g. pH and concentrations of the test substance)

and triclosan is rapidly eliminated after termination of the exposure. However, the B criterion is fulfilled and even the vB-criteria (BCF>5000 L/kg).

Methyl-triclosan is more hydrophobic than triclosan and is therefore liable to have a higher bioaccumulation than triclosan itself. The bioaccumulation potential of methyl-triclosan was studied by non standard experimental BCF' studies on fish. A BCF of 2000-5000 L/kg wet-wt and 18000 L/kg wet-wt was found. Based on the limited data available methyl-triclosan seems to fulfil the B criteria and would probably also fulfil the vB criterion; however further evaluations are necessary.

Toxicity criteria (T)

For triclosan the NOEC value for algae, the most sensitive aquatic species, is 0.0005 mg/l. Therefore, the T criterion is fulfilled as a chronic NOEC below 0.01 mg/L is found for triclosan.

Information on toxicity for methyl triclosan is very limited, and further information is needed for a detailed assessment of the T criteria. However based on the limited acute aquatic tests, algae seems the most sensitive species with a EC50 value of 0.17 mg/L and this is belowe the T criteria.

Thus triclosan fulfils the B and T criterion and is potentially persistent; however more information for the persistence is required. The major metabolite methyl-triclosan may to fulfil the P and B criteria for a PBT substance and even the vPvB criteria but only few guideline studies are available and more information is needed. However, as triclosan and its metabolites will be subject to further evaluation under REACH where it has been included on the Community Rolling Action Plan (CoRAP) and will undergo substance evaluation and is targeted to two identified areas of concern: PBT and endocrine disruption a further evaluation on these two properties will await the evaluation. Depending on the outcome of this evaluation, the possible approval of triclosan may then be reviewed according to BPR Article 15 if relevant.

POP assessment

According to triclosan's atmospheric half-life (1 day), triclosan does not demonstrate the potential for long-range transport. In this view, triclosan does not meet the criteria for being a persistent organic pollutant.

2.2.6. Exposure assessment

Exposure scenarios are used to describe the possible release of the biocidal product from its use and disposal. The following assessment is based on the Technical Guidance Document (TGD) (EC, 2003) and the EU Environmental Emission Scenario Documents for biocides used as human hygiene products for Product type 1 (EC, 2004), and modified at Environmental WG-V 2014, and is based on information related to the intended use (antimicrobial hand soaps and is restricted mainly to the scope of surgical operations). The representative soap is a model formulation which is not placed on the market for which the exposure and risk characterisation is accepted in this dossier contains 0.7% triclosan by weight.

The following environmental compartments might be exposed from the use of triclosan in liquid disinfectant soap:

- Sewage Treatment Plants (STP)

After exclusive indoor use of triclosan as active substance in disinfectant soaps for hand washing, the remaining triclosan will be disposed of down the drain. Thus, sewage treatment plants will be the receiving compartment for triclosan residues.

- Surface water and sediment

Due to the use pattern of triclosan, there are no direct emissions of triclosan to surface water and sediment. Any immediate exposure of aquatic or sediment organisms with triclosan can therefore be assumed negligible. The aquatic environment can be directly affected via effluents of waste water treatment procedures.

- Soil, Groundwater

Due to the use pattern of triclosan, potential direct contamination of the environment via the pathways soil and ground water is considered negligible. However, sludge from STP might be applied to agricultural land. Therefore, the STP sludge concentration and the concentrations in soil after one year and 10 years of sludge application are calculated. Due to low application rates and its sorption behaviour, calculations of triclosan concentrations in soil pore water is considered as being worst case estimation for groundwater concentration.

- Air

Based on the vapour pressure and Henry's Law constant, no significant volatilisation of triclosan is to be expected. Furthermore a short photochemical half-life of triclosan in the air has been calculated. Hence, air will not be an environmental compartment of concern.

Exposure scenarios
Two scenarios are considered for PEC calculation: the consumption-based approach and the tonnage-based approach. For the tonnage-based approach please see Doc IIB in the confidential folder.

Consumption-based approach
Due to significant variations between the assumptions from the ESD (EC, 2004) and real-life data concerning available hospital beds, corresponding health care personnel (per bed) and the typical use pattern for different kinds of disinfectant hand cleaning the WG-V-2014 agreed that there is a need to revise the scenario.

The following equation for the calculation of $Qsubst_{pres\_bed}$ and $Qsubst_{occup\_bed}$ was agreed:

$$Qsubst_{pres\_bed} = N_{FTE/bed} * Q_{form} * F_{form} * RHO_{form} * N_{appl}$$

The following specific default figures is used, based on a triclosan concentration of 0.7%:

$N_{FTE/bed}$	= *Number of hospital personal per bed [FTE/bed] (Default: 1.5 FTE)*
Q_{form}	= *Efficient dose rate of the hand disinfectant: 0.007) [kg]*
F_{form}	= *Fraction of active substance in the hand disinfectant 0.007*
RHO_{form}	= *Density of the product (Default: 1) [kg/L]*
N_{appl}	= *Number of disinfection events/FTE/day 4*
Reduction in use	*= fraction of use for surgical hand disinfection is 0.1*

Using worst case assumptions, daily consumption of active ingredient per bed is 0.0294 kg triclosan. Based on the agreed ESD for PT 1 this corresponds to a total daily emission rate of 0.0118 kg triclosan which enter the sewage water treatment plant (STP).

In the environmental exposure assessment the active substance triclosan is taken into consideration. Also the metabolite methyl triclosan in the terrestrial compartment is taken into

consideration as this metabolite is formed in soil at a concentration above 10%.

PEC for sewage treatment plant
The calculation of PEC_{STP} was conducted on the bases of a time-related prediction of the emission rate and default values related to the water treated in a STP.
For the distribution of the compound in a sewage treatment plant the substance is evaluated as being inherently biodegradable.
According to the recommendations given in the Simple-Treat model (estimated by EUSES)

Table 2.2-1: Distribution in STP when biodegradation is taken into account

	EUSES 2.1.2
The fraction of emission directed to air by STP	0.00528%
The fraction of emission directed to water by STP	54.5%
The fraction of emission directed to sludge by STP	8.31%
The fraction of emission degraded in STP	37.2%
Total	100%

The resulting $Clocal_{eff}$ based on Simple treat model in EUSES is 3.2 µg/L for the assessment of triclosan in liquid hand soap.
The parameter $Clocal_{eff}$ can also be regarded as the PEC_{STP} of triclosan, which represents the worst-case concentration that the micro-organisms in the sewage treatment plant are exposed to.

PEC for surface water
The Predicted Environmental Concentrations for the active substance triclosan were calculated for the environmental compartment surface water (PEC_{SW}).
As an overall result, a concentration in surface water during emission episode (dissolved) $Clocal_{water}$ (EUSES) of 0.32 µg/L.

When comparing with monitoring data in lakes and rivers where triclosan measured concentrations range from 0.0014 to 0.074 µg/L, it becomes obvious that the calculated values are conservative as it should be noted that the measured triclosan concentrations are derived by the sum of all triclosan-containing products, e.g. cosmetic products. [redacted]

As an overall result, the estimated values are presented in Table 2.2-2.

PEC for sediment
A PEClocal for sediment ($PEC_{sediment}$) according to EUSES of 6.03 µg/kgwwt was calculated.

A PEClocal for sediment ($PEC_{sediment}$) are presented in the Table 2.2-2 below.

PEC for soil
Due to the exclusive indoor use-pattern of triclosan, direct contamination of the environment via the pathway soil is negligible. However, STP sludge might be applied to soils. Therefore, the STP sludge concentration and the concentrations in soil after one year and 10 years of sludge application were calculated. A concentration in agric. Soil averaged over 30 days of 1.11 µg/kgwwt.
As a worst case a value of 24% of the triclosan concentration will be used as the PEC_{Soil} values for methyl-triclosan. This is an absolutely the worst case situation as no degradation is taken

into account. Based on this a PEC value for methyltriclosan of 0.27 µg/kgwwt can be calculated

Predicted Environmental Concentrations in soil (PEC_{soil}) are presented in the Table 2.2-2 below. Triclosan concentration in soil after 10 applications almost equals the concentrations after one year.

PEC for groundwater
Groundwater may be exposed through the application of sludge to soil. The concentration in ground-water is calculated as average concentration in soil pore water over 30 days for the terrestrial ecosystem and for human indirect exposure (drinking water) an average period of 180 days below agricultural area is used. A local PEC in pore water of agricultural soil was calculated to 0.019 µg/L.
The resulting concentrations in groundwater (PEC_{GW}) are presented in the Table 2.2-2 below.

PEC for atmosphere
Based on the vapour pressure (3×10^{-4} Pa) and the Henry`s Law constant (calculated, 7.24×10^{-3} Pa × m³ × mol^{-1}), triclosan is relatively non-volatile.
Based on the calculation according to Atkinson, the chemical lifetime of triclosan in the air was assessed to be less than one day. The degradation of triclosan residues by OH-radicals proceeds with a DT_{50} value of 23.9 hours. Therefore, a transport of triclosan over larger distances or an accumulation in the air can be excluded.
PEC for biota
According to the TGD, Part II, chapter 3.8.3.4, the $PECoral_{predator}$ is calculated from the PEC for surface water. The measured BCF for fish (for the calculation, the value of 8700 is used representing the highest, worst case BCF derived) and the biomagnification factor (BMF); is set to 10 based on the BCF value of 8700. The resulting concentration of triclosan in food (fish) of fish-eating predators ($PECoral_{predator}$) amounts to max. 27.8 mg/kg for the assessment. However it has to be recognised that the calculated values are conservative primary based on the estimation of PEC water and the conservative estimation of the BPC. It is recognized that the wide range of BCF values in fish (from 2532 to 8700), raises some uncertainty regarding the actual bioaccumulation potential of triclosan. Furthermore, most of the triclosan taken up by fish during the exposure phase was excreted after a depuration phase of less than 2 weeks (Boettcher 1991). According to [redacted] 2000, triclosan was eliminated from the fish organism at a rate (half-life) of 16.8 to 19.9 hours (the key study). Triclosan is rapidly biotransformed (glucuronides, sulfonides) in fish (James et al. 2012, Unilever 2975). As an excretory organ, triclosan is concentrated in the bile prior to its elimination. Triclosan is excreted in fish via the bile as inactive glucuronide (Adolfsson-Erici et al. 2002). However, based on an e-mail consultation in the Environmental Working Group after the WG meeting, it was decided that the concentration of triclosan in food (fish) of fish-eating predators ($PECoral_{predator}$) should be based on 27.8 mg/kg.
The resulting concentration of triclosan in food (fish) of fish-eating predators ($PECoral_{predator}$) are presented in Table 2.2-2 below.

Summary of PEC values used in the consumption based approach
Table 2.2-2 summarises the PEC values calculated for the local assessment of triclosan as a biocidal product for indoor use in liquid hand soap (containing 0.7% triclosan).

Table 2.2-2: **Summary of calculated PEC values for environmental compartments following**

Compartment	PEC value (Simple Treat STP distribution)
PEC_{STP} [µg/L]	3.2
$PEC_{surface\ water}$ [µg/L]	0.32
$PEC_{sediment}$ [µg/kg wwt]	6.03
PEC_{soil} [µg/kg wwt] PEC_{soil} [µg/kg wwt] for methyltriclosan	1.11 0.27
$PEC_{pore\ water}$ [µg/L]	0.0189
PEC_{air}	n.r n.r.
PEC_{biota} [mg/kg] worst case	27.8

On the basis of comprehensive literature review, triclosan concentrations in the influent and effluent of wastewater treatment plants and the concentrations in receiving rivers are available. However, the majority of triclosan (approximately [redacted]) is used in cosmetic consumer products eventually ending up in wastewater treatment plants. Residues originating from the biocidal use are therefore much lower than the monitoring concentrations comprising all different uses.
As an overall result, it can be concluded that triclosan is biodegradable in real world wastewater treatment systems although the STP efficacy is highly variable. Traces but measurable concentrations of triclosan may reach surface waters where further removal processes, such as biodegradation, photodegradation and settling take place. Triclosan is observed in STP sludge and therefore may reach soil by sludge application. From field data it is evident that the PEC values calculated by the consumption approach are conservative.

2.2.7. Risk characterisation

Risk characterisation for the environment for the consumption-based approach
A PEC/PNEC relation for the STP compartment was calculated (see Table 2.2-3).

Table 2.2-3: PEC/PNEC ratios concerning exposure of micro-organisms in sewage treatment plants according to the consumption based approach

Compartment	PEC_{STP} e) [µg a.s./L]	$PNEC_{microorganisms}$ [µg a.s./L]	$\frac{PEC}{PNEC}$
Sewage treatment plant	3.2	110	0.03

e) Distribution according to Simple Treat in EUSES.

The calculations revealed a PEC/PNEC relation for the STP compartment is below 1 , indicating that no risk for the micro-organisms in STP due to the use of triclosan as this disinfectant soap for hand washing is expected.

For the aquatic compartment, conservative worst-case assumptions are used (e.g. no biodegradation and no photodegradation in surface water). For the quantitative risk assessment $PNEC_{surface\ water}$ will be compared with the $PEC_{surface\ water}$.

Table 2.2-4: PEC/PNEC ratio concerning exposure of the aquatic compartment

Compartment	PEC_{SW} [µg a.s./L]	$PNEC_{water}$ [µg a.s./L]	$\frac{PEC}{PNEC}$
Surface water	0.32	0.05	**6.4**

The PEC/PNEC ratio is above 1 indicating a risk for surface water due to the use of triclosan as this disinfectant soap for hand washing.

The sediment compartment can only be affected consecutive to emissions to surface water. The PEC/PNEC ratio for sediment dwelling organisms is presented in the table below.

Table 2.2-5:PEC/PNEC ratio concerning exposure of the sediment compartment

Compartment	PEC_{sed} [µg a.s./kg wwt sediment]	$PNEC_{sed}$ [µg a.s./kg wwt. sediment]	$\frac{PEC}{PNEC}$
Sediment	6.03	988	**0.006**

The PEC/PNEC ratio for sediment dwelling organisms is below 1, indicating that sediment dwelling organisms are not at risk by the intended uses of triclosan as an antimicrobial component of this disinfecting soap.

To assess the risk for the environmental compartment soil regarding the exposure via sludge, the $PNEC_{soil}$ is compared with the PEC_{soil} (see Table 2.2-6).

Table 2.2-6:PEC/PNEC ratio concerning exposure of the soil compartment

Compartment	PEC_{soil} e) [µg a.s./kg wwt soil]	$PNEC_{soil}$ [µg a.s./kg wwt soil]	$\frac{PEC}{PNEC}$
Soil *	1.11	115	**0.016**

* exposure via STP sludge

The calculation revealed a PEC/PNEC relation for the soil compartment below the trigger value of 1. Thus, no relevant risk for soil organisms due to the use of Triclosan as is indicated.
For the metabolite methyl triclosan a $PNEC_{soil}$ of 1.27 µg a.s./kg wwt soil was identified. The PEC value of 0.27 µg a.s./kg wwt soil was found. The PEC/PNEC ratio concerning the methyl triclosan is those 0.21. The calculation revealed a PEC/PNEC relation for the soil compartment below the trigger value of 1. Thus, no relevant risk for soil organisms due to the use of methyl triclosan as is indicated.

The concentration in groundwater is calculated for indirect exposure of humans through drinking water. As an indication for potential groundwater levels, the concentration in porewater of agricultural soil is taken.

Table 2.2-7: PEC/PNEC ratio concerning exposure of the groundwater compartment

Compartment	PEC_{GW} [µg a.s./L]	"$PNEC_{GW}$" [µg a.s./L]	$\frac{PEC}{PNEC}$
Ground water	0.019	0.1	**0.19**

.

The PEC/PNEC ratio is below 1 indicating no potential risk for ground water.

The atmosphere is not a relevant emission compartment for triclosan due to the intended indoor use and its physico-chemical properties (volatilisation of triclosan is negligible). A quantitative risk assessment, i.e. calculation of PEC/PNEC ratio, is therefore considered not necessary.

The concentration of triclosan in food (fish) of fish-eating predators ($PECoral_{predators}$) is presented in the table below together with the PEC/PNEC ratio.

Table 2.2-8: Risk quotients for secondary poisoning worst case (aquatic food chain)

Compartment	$PEC_{oral,\ predators}$ e) [mg a.s./kg]	$PNEC_{oral,\ birds}$ [mg a.s./kg food]	$\frac{PEC}{PNEC}$
Fish eating birds	27.8 (pH 6)	1.67	**16.6**

As the PECpredator is higher than the PNECoral (16.6), a risk from non-compartment specific exposure relevant to the food chain due to the proposed use of triclosan is identified. However, the wide range of BCF values in fish raises some uncertainty regarding the actual bioaccumulation potential of triclosan. This PEC value is based on a BCF of 8700 which is the highest value identified (pH = 6). The BCF varies strongly with the pH of the media and decrease at higher pH values; however these values are considered as representing a realistic worst case. Furthermore, it should be noted that an assessment factor of 3000 has been used for the PNECoral, birds as no chronic data was available therefore this value also represent a realistic worst case situations. Furthermore, there are several other factors that might influence the effects on fish eating predators due to bioaccumulation via the food chain. The depuration half-life in fish is short (1-2 days) ([redacted] 2000) and triclosan is excreted in fish via the bile as inactive glucuronides (Adolfsson-Erici et al. 2002). However, after consultations with the Agency and the other Member Stats it was concluded that the PEC/PNEC ratio for secondary poisoning was 16.6 and a risk was identified.

Therefore based on the consumption-based approach, a risk is identified for both surface water and for the non-compartment specific effects relevant to the food chain (secondary poisoning). Based on the specific evaluated use no possibilities for any risk mitigation measures seem to be realistic.

Tonnage-based approach.

For the tonnage-based risk assessment please refer to Doc.II-B for PT 1 in the confidential folder.

Based on the tonnage approach it can be concluded that no safe use can be demonstrated for the proposed use of triclosan in PT 1.

However, based on the specific use of the formulated product (the use of the formulated product is restricted mainly to the scope of surgical operations in hospitals) it is the opinion of the RMS that the tonnage-based approach is not appropriate to use for this specific use-scenario.

2.2.8. Assessment of endocrine disruptor properties

A preliminary assessment of endocrine disruptor properties is carried out for triclosan according to the interim criteria, described in Article 5.3 of Regulation (EU) No 528/2012. According to these interim criteria, triclosan shall not be considered as having endocrine-disrupting properties. However, as triclosan and its metabolites will be subject to further evaluation under REACH where it has been included on the Community Rolling Plan (CoRAP) and will undergo substance evaluation and is targeted to two identified areas of concern: PBT and endocrine disruption a further evaluation on these two properties will await the final evaluation under REACH.

2.3. Overall conclusions

The outcome of the assessment for triclosan in product-type 1 is specified in the BPC opinion following discussions at the 11th meeting of the Biocidal Products Committee (BPC). The BPC opinion is available from the ECHA website.

2.4. List of endpoints

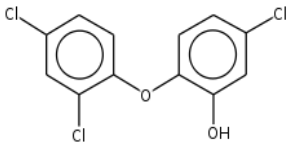
The most important endpoints, as identified during the evaluation process, are listed in Appendix I.

Appendix I: List of endpoints

Chapter 1:Identity, Physical and Chemical Properties, Classification and Labelling

Active substance (ISO Name)	Triclosan
Product-type	PT 1: Human hygiene biocidal product

Identity

Chemical name (IUPAC)	5-Chloro-2-(2,4-dichlorophenoxy)-phenol
Chemical name (CA)	Phenol, 5-chloro-2-(2,4-dichlorophenoxy)-
CAS No	3380-34-5
EC No	222-182-2
Other substance No.	None
Minimum purity of the active substance as manufactured (g/kg or g/l)	Triclosan has a specified minimal purity of 970 g/kg.
Identity of relevant impurities and additives (substances of concern) in the active substance as manufactured (g/kg)	2,3,7,8-tetrachlorodibenzo-p-dioxin and 2,3,7,8-tetrachlorodibenzofuran (< 0.001 µg/kg for both impurities).
Molecular formula	$C_{12}H_7Cl_3O_2$
Molecular mass	289.6 g/mol
Structural formula	

Physical and chemical properties

Melting point (state purity)	56.35 °C (purity: 100.5%)
Boiling point (state purity)	No boiling point was determined. The active substance showed decomposition when heated. Decomposition temperature 253°C
Thermal stability / Temperature of decomposition	As no thermal effect was found between room temperature and 150 °C (except melting point of active substance), triclosan is considered to be stable at room temperature.
Appearance (state purity)	Crystalline white powder with trace aromatic odour (purity: 100%).
Relative density (state purity)	1.55 at 22 °C (purity: 100.5%)
Surface tension (state temperature and concentration of the test solution)	72.24 +/- 0.07 mN/m at 21.5°C and 90% saturation.
Vapour pressure (in Pa, state temperature)	3×10^{-4} Pa at 20 °C (extrapolated), 7×10^{-4} Pa at 25 °C (extrapolated)

Henry's law constant (Pa m^3 mol^{-1})	Ratio between vapour pressure and water solubility: 7.24×10^{-3} Pa m^3 mol^{-1} at 20 °C and pH 7 1.30×10^{-2} Pa m^3 mol^{-1} at 20 °C and pH 5
Solubility in water (g/l or mg/l, state temperature)	pH 5: 6.5 mg/L at 20 °C pH 7: 12 mg/L at 20 °C pH 9: Not measured
Solubility in organic solvents (in g/l or mg/l, state temperature)	Solubility in n-hexane: 16.5 g/L at 10 °C 31.5 g/L at 20 °C 63.2 g/L at 30 °C Solubility in n-octanol: 521 g/L at 10 °C 481 g/L at 20 °C 556 g/L at 30 °C
Stability in organic solvents used in biocidal products including relevant breakdown products	Not applicable because triclosan as manufactured does not include an organic solvent.
Partition coefficient (log P_{OW}) (state temperature)	pH 5: Log Kow = 5.2 at 10 °C Log Kow = 4.9 at 20 °C Log Kow = 4.7 at 30 °C pH 6.7: Log Kow = 4.8 at 25 °C pH 9: Not measured
Dissociation constant	pKa = 8.14
UV/VIS absorption (max.) (if absorption > 290 nm state ε at wavelength)	Maxima at 281.0 nm (ε = 4817 mol^{-1} L cm^{-1}, neutral solution), 281.0 nm (ε = 4800 mol^{-1} L cm^{-1}, acid solution) and 293.4 nm (ε = 6810 mol^{-1} L cm^{-1}, alkaline solution).
Photostability (DT_{50}) (aqueous, sunlight, state pH)	The aqueous photolysis half-life of ^{14}C-triclosan was calculated to be 41 minutes. Two photodegradation products were observed: 2,4-dichlorphenol (pH < pKa) and 2,8-dichlorodibenzo-p-dioxin (pH > pKa).
Quantum yield of direct phototransformation in water at Σ > 290 nm	The quantum yield was not calculated.

Flammability or flash point	Triclosan is not highly flammable according to EEC A10. The appraisal of structure indicates no risk with respect to pyrophoric properties or the potential of evolving flammable gases in contact with water or humid air
Explosive properties	Triclosan does not present any risk for explosion.
Oxidising properties	Triclosan does not present any oxidising properties.

Classification and proposed labelling

with regard to physical hazards	No classification / labelling results from the physico-chemical properties.
with regard to human health hazards	Eye Irrit. 2 Skin Irrit. 2 H319: Causes serious eye irritation H315: Causes skin irritation P264; P280; P350 + P351 + P338;
with regard to environmental hazards	Aquatic acute 1 (M=100) Aquatic chronic 1 (M=100) H400 Very toxic to aquatic life H410 Very toxic to aquatic life with long lasting effects P273 – Avoid release to the environment P391 – Collect spillage P501 – Dispose of contents/container in accordance with local/regional/national/international regulation (to be specified).

Chapter 2:Methods of Analysis

Analytical methods for the active substance

Technical active substance (principle of method)	The assay of triclosan in the active substance as manufactured is determined using a capillary gas chromatograph equipped with a flame ionisation detector. The quantification is done by external standard method.
Impurities in technical active substance (principle of method)	The analytical method for the determination of impurities in the active substance as manufactured is confidential. This information is provided separately in the confidential part of the dossier.

Analytical methods for residues

Soil (principle of method and LOQ)	Submitted method not acceptable. A data gap is identified for this endpoint.
Air (principle of method and LOQ)	Not required
Water (principle of method and LOQ)	Submitted method not acceptable. A data gap is identified for this endpoint.
Body fluids and tissues (principle of method and LOQ)	Not applicable because triclosan is not classified as toxic or highly toxic.
Food/feed of plant origin (principle of method and LOQ for methods for monitoring purposes)	Not required as the active substance is not used in a manner that may cause contact with food or feedstuffs. (please refer to the corresponding Document III B (Section 4.2) or Document II B (Section 1.4).

Chapter 3:Impact on Human Health

Absorption, distribution, metabolism and excretion in mammals

Rate and extent of oral absorption:	70 % (rats)
Rate and extent of dermal absorption*:	Human, *in vitro*: 13% of dose (0.02% triclosan in soap formulation, 10 min exposure) Human, *in vitro*: 52% of dose (1.9% triclosan in 90% ethanol, 24 h exposure)
Distribution:	Plasma proteins
Potential for accumulation:	None
Rate and extent of excretion:	Rat: 90.0 % excretion within 4 days Human: 72.0 - 98.4 % excretion within 3 - 6 days Hamster: 60.4 - 80.0 % excretion within 7 days
Toxicologically significant metabolite(s)	None

* the dermal absorption value is applicable for the active substance and might not be usable in product authorization

Acute toxicity

Rat LD_{50} oral	> 5000 mg/kg (♂ +♀)
Rat LD_{50} dermal	> 6000 mg/kg (♂ +♀)
Rat LC_{50} inhalation	Not required, triclosan is non-volatile and is not used in spray applications

Skin corrosion/irritation	Irritating. Xi, R38

Eye irritation	Irritating. Xi, R36

Respiratory tract irritation	Classification not proposed
Skin sensitisation (test method used and result)	Not sensitising (Modified Buehler test, GPMT)
Respiratory sensitisation (test method used and result)	No test available. This endpoint is not considered relevant as triclosan is not skin sensitising nor volatile.

Repeated dose toxicity

Short term

Species / target / critical effect	Rat/ hepatic effects / hepatic centrilobular hypertrophy and fatty change
Relevant oral NOAEL / LOAEL	65 / 203 mg/kg bw/day (13 week rat, oral)
Relevant dermal NOAEL / LOAEL	-
Relevant inhalation NOAEL / LOAEL	-

Subchronic

Species/ target / critical effect	Rat/ hepatic effects / hepatic centrilobular hypertrophy and fatty change
Relevant oral NOAEL / LOAEL	65 / 203 mg/kg bw/day (13 week rat, oral)
Relevant dermal NOAEL / LOAEL	80 mg/kg bw/ day (90 days rat, dermal)
Relevant inhalation NOAEL / LOAEL	-

Long term

Species/ target / critical effect	Rat/ haematology / clotting time, monocytes, white blood cell count,
Relevant oral NOAEL / LOAEL	40 / 127 mg/kg bw/day (2 year rat, oral)
Relevant dermal NOAEL / LOAEL	80 mg/kg bw/ day (90 days rat, dermal)
Relevant inhalation NOAEL / LOAEL	-

Genotoxicity	Negative

Carcinogenicity

Species/type of tumour	Negative in rats and hamsters, positive in mice, but available mechanistic data supports MoA not being relevant for humans.
Relevant NOAEL/LOAEL	-

Reproductive toxicity

Developmental toxicity

Species/ Developmental target / critical effect	Rat: retarded ossification (w/ maternal toxicity) Rabbit: no developmental effects
Relevant maternal NOAEL	50 mg/kg/day
Relevant developmental NOAEL	50 mg/kg/day

Fertility

Species/critical effect	Rat: reduced viability index in F1 pups
Relevant parental NOAEL	238/285 mg/kg/ day (♂/♀)
Relevant offspring NOAEL	152/76 mg/kg/ day (♂/♀)
Relevant fertility NOAEL	238/285 mg/kg/ day (♂/♀)

Neurotoxicity

Species/ target/critical effect	Acute and repeated-dose studies in several species did not indicate the occurrence of preliminary signs of neurotoxic effects of triclosan. Contradictive in vitro and in vivo results on potential muscle function available, though they are not considered relevant.

Developmental Neurotoxicity

Species/ target/critical effect	Not tested.

Immunotoxicity

Species/ target/critical effect	Not tested.

Developmental Immunotoxicity

Species/ target/critical effect	Not tested.

Other toxicological studies

Mouse, rat, hamster: analysis of peroxisome proliferation and hepatocellular proliferation:

Massive peroxisome proliferation was induced by triclosan in the mouse but not in hamsters or rats. Hepatocytic proliferation was only noted in mice. The results demonstrate that the liver tumours found in mice are not relevant for humans.

Medical data

No reports on clinical cases or poisoning incidents.

Medicinal surveillance during triclosan production did not reveal adverse effects in workers.

Summary

Value	Study	Safety factor

$AEL_{long\text{-}term}$	0.28 mg/kg bw/day	Chronic oral rat (2 year)	100
$AEL_{medium\text{-}term}$	0.455 mg/kg bw/day	Sub-chronic oral rat (13 week)	100
$AEL_{short\text{-}term}$	0.455 mg/kg bw/day	Sub-chronic oral rat (13 week)	100
ADI[3]	0.4 mg/kg bw/day	Chronic oral rat (2 year)	100
ARfD	-	-	-

MRLs

Relevant commodities	Not relevant

Reference value for groundwater

According to BPR Annex VI, point 68	Not relevant

Dermal absorption

Study (*in vitro/vivo*), species tested	Human, *in vitro*
Formulation (formulation type and including concentration(s) tested, vehicle)	0.02% triclosan in soap formulation, 10 min exposure
Dermal absorption values used in risk assessment	13%

Acceptable exposure scenarios (including method of calculation)

Formulation of biocidal product	0.7% triclosan in soap formulation		
Intended uses	Liquid hand soap formulation for hygiene and surgical hand disinfection by professionals (10 and 4 uses per day, respectively)		
Industrial users	Not relevant		
Professional users		% AEL:	MOE:
	10 uses	190 %	53
	4 uses	76 %	132
Non professional users	Not relevant		
General public	Exposure via mother's milk MOE – 10,270		
Exposure via residue in food	Not relevant		

C **Route and rate of degradation in water**

[3] If residues in food or feed.

Hydrolysis of active substance and relevant metabolites (DT_{50}) (state pH and temperature)	pH 5: stable at 50 °C
	pH 7: stable at 50 °C
	pH 9: stable at 50 °C Estimated DT_{50} > 1 year for 25 °C
Photolytic / photo-oxidative degradation of active substance and resulting relevant metabolites	Experimental DT_{50} (pH dependent; pK_a = 8.14) - 41 minutes at <u>pH 7</u>; 1.68 x 10^{-2} $minute^{-1}$ rate constant (pseudo first order reaction kinetics) Met.: 2,4-dichlorophenol (95.2% at 240 minutes) - 15-26 minutes at <u>pH 8.6</u> Met.: 2,8-dichlorodibenzo-p-dioxin (12% at maximum) Direct photodegradation rate of triclosan: quantum yield = 0.31 (at 313 nm) Rhine and Neckar (Central Europe): DT_{50} < 10 days for more than half of the year DT_{50} = approx. 90 days in winter time Hypothetical shallow river (Southern Finland): DT_{50} < 100 days for half of the year DT_{50} = max. 2000 days in winter (Modelling with GCSOLAR 1995)
Readily biodegradable (yes/no)	No; 18-36% biodegradation after 28 d 0% biodegradation at a dose of 100 mg/L after 28 d (A dose-response relationship seems to appear). Triclosan is inherently primary biodegradable: 99.4% primary biodegradation after 14 d (inherent test); however do to test design the criteria for inherent biodegradability were not fulfilled <u>CAS-testing with activated sludge (2 systems)</u> Degradation of parent compound: 1) 98.2 to 99.3% primary degradation and 74-77%mineralization 2) > 94% primary degradation; 76-90% mineralization.
Biodegradation in seawater	Not relevant since triclosan is not used or

	released in the marine environment at considerable amounts. Therefore, a seawater biodegradation test is not required.
Non-extractable residues	32.4-33.0% after 104 days
Distribution in water / sediment systems (active substance)	water phase: < 0.1% (104 d) sediment extracts: 21.3-21.8% (104 d) DT_{50} = 1.2-1.4 days (water) DT_{50} = 56.4-56.3 days (sediment) DT_{50} = 41.1-58.3 days (whole system) first order kinetics, Recalculated to **12°C:** DT_{50} = 2.3 to 2.7 days (water) DT_{50} = 106 days (sediment) DT_{50} = 78 days (whole system, river) DT_{50} = 110 days (whole system, pond)
Distribution in water / sediment systems (metabolites)	water phase: Methyltriclosan (M7): not detected M8 (not identified): not detected sediment extracts: Methyltriclosan (M7): 3.4-4.8% (104 d) M8 (not identified): max. 6.5% (56 d), 0-5-5.5% (104 d)

Route and rate of degradation in soil

Mineralization (aerobic)	11.5-16.2% after 124 days (n = 3, 20 ± 2 °C) 5.1% after 124 days (n = 1, 10 ± 2 °C) 11.9-20.1% after 64 days (n = 3, 22 ± 3 °C) [System 1]
Laboratory studies (range or median, with number of measurements, with regression coefficient)	DT_{50lab} (20°C, aerobic): 1) $DT_{50\ lab}$ (20 ± 2 °C, aerobic): 2.46-3.28 days (n = 3) 2) $DT_{50\ lab}$ (20 ± 2 °C, aerobic): 17.4-35.2 days, n = 3, r^2 = 0.89-0.96 Recalculated to **12 °C**: $DT_{50\ lab}$ (12 °C): 4.7- 99.6 days (n = 6) Geometric mean. = 19.3 days (for risk assessment used 19.3 days)
	DT_{90lab} (20°C, aerobic): $DT_{90\ lab}$ (20 ± 2 °C, aerobic): 19.1-25.7 days (n = 3)
	DT_{50lab} (10°C, aerobic): 10.7 days (n = 1)

	$DT_{90\ lab}$ (10 ± 2 °C, aerobic): 231 days (n = 1)
	DT_{50lab} (20°C, anaerobic):
	degradation in the saturated zone:
Field studies (state location, range or median with number of measurements)	DT_{50f}: Not relevant
	DT_{90f}:
Anaerobic degradation	No biodegradation of triclosan in sewage sludge under anaerobic conditions.
Soil photolysis	Not relevant due to indoor use.
Non-extractable residues	60.8-75.8% after 124 days (n = 3, 20 ± 2 °C) 59.6% after 124 days (n = 1, 10 ± 2 °C) 37.7-59.7% after 64 day (n = 3, 22 ± 3 °C) [System 1]
Relevant metabolites - name and/or code, % of applied active ingredient (range and maximum)	Methyl-Triclosan, 24.0% at maximum (day 28) $DT_{50\ lab}$ (20 ± 2 °C, aerobic): 39.2-153 (n = 3) $DT_{50\ lab}$ (recalculated to12°C, aerobic): 74-290 , with a geomean = 158 days (n = 3) $DT_{90\ lab}$ (20 ± 2 °C, aerobic): 130-509 days (n = 3)
Soil accumulation and plateau concentration	Not relevant

Adsorption/desorption

Ka , Kd Ka_{oc} , Kd_{oc} pH dependence (yes / no) (if yes type of dependence)	Adsorption, OECD TG 121 (HPLC screening): K_{oc} = 831.8 (used for the risk assessment) QSAR estimation: K_{oc} = 8417 Adsorption to suspended solids: K_{OC} = 49,438 Metabolite: Methyl-triclosan Koc = 417 (HPLC screening) (and used in the risk assessment) Koc = 11749 (based on QSAR)

Fate and behaviour in air

Direct photolysis in air	Not relevant because there is no relevant release of the compound to the air compartment
Quantum yield of direct photolysis	ϕ = 0.31 at 313 nm (aqueous photolysis)
Photo-oxidative degradation in air	DT_{50} = 1 day (calc.)
Volatilization	Not relevant because there is no relevant release of the compound to the air compartment

Monitoring data, if available

Soil (indicate location and type of study)	No data presented
Surface water (indicate location and type of study)	Wastewater treatment plants **- Singer et al. (2002), Switzerland** Biological degradation = 79%; sorption to sludge = 15% Conc. in wastewater effluents: 42-350 ng/L (n = 10) Conc. in receiving rivers: 11-98 ng/L (n = 2) **- Bester (2005), Germany** Elimination rate = 87-95% Conc. in STP effluents: 10-600 ng/L TCS - **Sabaliunas et al. (2003), UK (Yorkshire)** Removal rate = approx. 95% Conc. in influent wastewater: 21.9 µg/L (Crofton, AS), 7.5 µg/L (Meltham, TF) Conc. in final effluent: 1.1 µg/L (Crofton), 0.34 µg/L (Meltham) **- McAvoy et al. (2002), USA** Removal rate = 96% (AS, n = 2), 58-86% (TF = 3) Conc. in influent wastewater: 3.8-16.6 µg/L (n = 5) Conc. in final effluent: 0.2-2.7 µg/L (n = 5) Conc. in digested sludge: 0.5-15.6 µg/g (dry wt) **- Morrall et al. (2004), USA (South Central Texas)** Conc. in final effluent: 0.785 µg/L

- Thomas and Foster (2005), USA (MD)

Removal rate = > 95% (n = 3)

Conc. in influent wastewater: 3.0-3.6 µg/L (n = 3)
Conc. in final effluent: 0.028-0.072 µg/L (n = 3)

- Halden and Paull (2005), USA
Removal rate = > 99%
Conc. in raw wastewater: 6100 (± 1600) ng/L
Conc. in final effluent: 35 (± 20) ng/L

- **Nordic Biocide Group (2005), Northern Europe**

Removal rate = 75-94% (n = 4)

Conc. in influent wastewater: 0.4-1.6 µg/L (n = 4)
Conc. in final effluent: 0.01-0.2 µg/L (n = 4)

- Lee and Peart (2002), Canada

Conc. in sewage sludge (35 samples)

0.90-28.2 µg/g (median = 12.5 µg/g d.w.)

- Lindström et al. (2002), Switzerland

Conc. in influent wastewater:

TCS: 0.6-1.3 µg/L, Methyl-TCS: ≤ 4 ng/L
Conc. in final effluent:

TCS: 110 and 650 ng/L (not considering acidified and methylated WWTP samples of 1997), Methyl-TCS: up to 11 ng/L

<u>Surface water</u>

- Adam (2006), Switzerland
Background concentration in water/sediment systems (river and pond): < LoD in water phase
(LOD = 0.002 µg/l)

- Singer et al. (2002), Switzerland
Removal rate: 0.03 d^{-1} (epilimnion of lake Greifensee)
Amount in tributary rivers = 0.080 µg/l (n = 3)

- Wind et al (2004), Germany

	Amount in river Itter catchment: 0.090 µg/l - **Sabaliunas et al. (2003), UK (Yorkshire)** In-stream removal rate: 0.21-0.33 h^{-1} Conc. downstream from the WWTP discharge point: downstream - 20 m: 0.08 µg/L (n = 3) downstream - 750 m: 0.053 µg/L (n = 3) downstream - 1500 m: 0.043 µg/L (n = 3) downstream - 3500 m: 0.044 µg/L (n = 3) GREAT-ER (Geography-Referenced Regional Exposure Assessment Tool for European Rivers) model: PECinitial (mean): 0.3349 µg/L **- Bester (2005), Germany** Surface water conc.: TCS: < 3-10 ng/L, Methyl-TCS: < 0.3-5 ng/L In-stream removal rate: TCS: 0.062 d^{-1}, Methyl-TCS: 0.066 d^{-1} **- Morrall et al. (2004), USA (South Central Texas)** First-order loss rate (incl. sorption and settling): 0.06 h^{-1}, half-life = 11.3 h (76% reduction) First-order loss rate (without sorption and settling): 0.25 h^{-1} Conc. downstream the effluent discharge: downstream - 200 m: 0.431 µg/L downstream - 2000 m: 0.223 µg/L downstream - 8000 m: 0.104 µg/L) **- Lindström et al. (2002), Switzerland** Greifensee: TCS: up to 14 ng/L, Methyl-TCS: up to 0.8 ng/L Zürichsee: TCS:up to 3 ng/L, Methyl-TCS: n.d. River Glatt: up to 74 ng/L, Methyl-TCS: 2 ng/L **- Balmer et al. (2004), Switzerland** Surface water conc.: < 0.02 ng/L in Jörisee and Hüttnersee, 0.4-0.5 ng/L in Zürichsee and 0.8-1.2 ng/L in Greifensee
Ground water (indicate location and type of study)	No data presented

Air (indicate location and type of study)	No data presented

Chapter 5: Effects on Non-target Species

Toxicity data for aquatic species (most sensitive species of each group)

Species	Time-scale	Endpoint	Toxicity
Fish			
Triclosan			
Danio rerio	96 hours	Mortality	LC_{50} = 0.48 mg/L (m)
Oncorhynchus mykiss	96 days (61d post hatching)	Reproduction	NOEC = 34.1 µg/L (m)
Methyl-triclosan, main metabolite of triclosan in water / sediment systems			
Danio rerio (formerly *Brachydanio rerio*)	96 hours	Mortality	LC_{50} = 4.37 mg/L
Invertebrates			
Triclosan			
Daphnia magna	48 hours	Mortality	EC_{50} = 0.24 mg/L (m)
Ceriodaphnia dubia	7 days	Survival & repro-duction	NOEC = 0.006 mg/L (n)
Methyl-triclosan, main metabolite of triclosan in water / sediment systems			
Daphnia magna	48 hours	Immobilization	EC_{50} >> 0.18 mg/L
Algae			
Triclosan			
Scenedesmus subspicatus	96 hours	Growth inhibition	E_bC_{50} = 0.7 µg/L (m) E_rC_{50} = 2.8 µg/L (m) NOEC = 0.5 µg/L (m)
Methyl-triclosan, main metabolite of triclosan in water / sediment systems			
Scenedesmus subspicatus	72 hours	Growth inhibition	E_bC_{50} = 0.12 mg/L E_rC_{50} = 0.17 mg/L NOEC = 0.04 mg/L
Aquatic plants			
No acceptable study was submitted			

Species	Time-scale	Endpoint	Toxicity
Sediment dwelling organisms			
Chironomus riparius	28 d	Emergence ratio & development rate	NOEC > 100 mg/kg dry (n)
Microorganisms			
Triclosan			
Activated sludge	3 hours	Inhibition of respiratory rate	EC_{50} = 11 mg/L (n)
Methyl-triclosan, main metabolite of triclosan in water / sediment systems			
Activated sludge	Not specified	Inhibition of respiratory rate	EC_{50} > 100 mg/L

[1]based on 33.1% recovery

(n) nominal

(m) measured value

Effects on earthworms or other soil non-target organisms

Acute toxicity to earthworms	LC_{50} (14 days) > 1026 mg/kg dry soil (n) Corrected for organic matter 349 mg/kg dry soil (n)
Reproductive toxicity to earthworms	NOEC = 101.8 mg/kg dry soil (m) Corrected for organic matter 35 mg/kg dry soil

Effects on other soil non-target organisms

Chronic toxicity to Predatory mite *Hypoaspis aculeifer*	NOEC = 1.3 mg/kg dry soil (m) Corrected for organic matter

Effects on terrestrial plants

Long term toxicity to terrestrial plants (Annex IIIA, point XIII.3.4)	NOEC (21 days) = 57 µg/kg dry soil (m) (*Cucumis sativus*, cucumber) Corrected for organic matter 1.4 mg/kg dry soil

Effects on soil micro-organisms

Nitrogen mineralization	28 d-EC_0 > 2.0 mg a.s./kg dw soil (n) Corrected for organic matter 3.9 mg/kg dry soil
Carbon mineralization	

Effects on terrestrial vertebrates

Acute toxicity to mammals	LD_{50} > 5000 mg/kg bw (♂ + ♀, oral, rat)
Acute toxicity to birds	LD_{50} = 862 mg/kg bw (n) (*Colinus virginianus*)
Dietary toxicity to birds	LC_{50} > 5000 mg/kg diet (n) (*Colinus virginianus*)
Reproductive toxicity to birds	No data required

Effects on honeybees

Acute oral toxicity	No data required
Acute contact toxicity	No data required

Effects on other beneficial arthropods

Acute oral toxicity	No data required
Acute contact toxicity	No data required
Acute toxicity to ……..	No data required

Bioconcentration

Bioconcentration factor (BCF)	BCF = between 2532 and 8700g/L (measured) (whole fish) BCF = 2398.8 (calculated based on log Kow) BCF of 8700g/L will be used for the Risk Assessment.
Depuration time (DT_{50}) (DT_{90})	DT_{90} < 1 week
Level of metabolites (%) in organisms accounting for > 10 % of residues	No metabolites determined

Chapter 6: Other End Points

None

Appendix II: List of Intended Uses

Object and/or situation	Product name	Organisms controlled	Formulation		Application			Applied amount per treatment			Re marks:
			Type (d-f)	Conc. of a.s. (i)	method kind (f-h)	number min max	interval between applications (min)	g a.s./L min max	water L/m^2 min max	g a.s./m^2 min max	
Personal hygiene PT 1	Hand soap Product	Bacteria and viruses	SC	7 g/kg	hand washing	1 - 4 per day	-	3 g/L	–	–	Dummy formulation, not a commercial product. Only for professional use

Appendix III: List of studies

Data protection is claimed by the applicant in accordance with Article 60 of Regulation (EU) No 528/2012.

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
[redacted]	2006	14C-Triclosan: Route and rate of degradation in aerobic aquatic sediment systems. Date: 2006-07-25	Study Number: [redacted]0	No	Yes	BASF SE	7.1.2.2.2
[redacted]	2007	14C-Triclosan: Degradation and metabolism in three soils incubated under aerobic conditions. Date: 2007-07-XX	Study Number: [redacted]	No	Yes	BASF SE	7.2.1(01)
Aranami, K and Readman, JW	2007	Photolytic degradation of triclosan in freshwater and seawater	*Chemosphere 66(6): 1052-1056*	Yes	No	-	7.4 Non-key Published
[redacted]	1989	Report on the test for ready biodegradability of [redacted] in the modified sturm test. Date: 1989-02-28	Project No.: [redacted]	No	Yes	BASF SE	7.1.1.2.1(01)
[redacted]	2006a	Methyl-triclosan: Acute toxicity to *Daphnia magna* in a 48-hours immobilisaiton test. Date: 2006-07-19	Study-No. [redacted]	No	Yes	BASF SE	7.4.1.2(04) Non-key
[redacted]	2006b	Methyl-triclosan: Toxicity to *Scenedesmus subspicatus* in a 72-hour algal growth inhibition test. Date: 2006-07-24	Study-No. [redacted]	No	Yes	BASF SE	7.4.1.3(06) Non-key
[redacted] U.	2007	Triclosan, Calculation of Henry's Law Constant. Date: 2007-07-10	2007/07/10/UB	No	Yes	BASF SE	3.2(02)

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
Bentley, P. *et al.*	1993	Hepatic Peroxisome Proliferation in Rodents and its Significance for Humans.	*Fd. Chem. Toxic.,* 31, 857-907	No	No	–	Non-key Published
[redacted]	2007 a	Determination of the boiling point of [redacted]) according to OECD 103 resp. EU A.2. Date: Sept. 2007	[redacted]	No	Yes	BASF SE	3.1(02)
[redacted]	2007 b	Determination of the surface tension of [redacted]) according to OECD 115 resp. EU A.5. Date: Sept. 2007	[redacted]	No	Yes	BASF SE	3.13(01)
[redacted]	1990 a	Report on the modified MITI-Test – OECD 301 C – ready biodegradability of [redacted]. Date: 1990-08-22	Test No.: [redacted]	No	Yes	BASF SE	7.1.1.2.1(02)
[redacted]	1990 c	Report on the determination of the IC_{50} (Inhibitory Concentration) – OECD 209 – of [redacted] Date: 1990-02-14	Test-No. G [redacted]	No	Yes	BASF SE	7.4.1.4(02) Non-key
[redacted]	1991	Report on the bioaccumulation test – OECD 305C – of [redacted]. Date: 1991-01-07	Test-No.: [redacted]	No	Yes	BASF SE	7.4.3.3.1(01)
[redacted]	1990	Acute toxicity of [redacted]1 to Fathead Minnow (*Pimephales promelas*). Date: 1990-07-20	Report-No. [redacted]	No	Yes	The Procter & Gamble Company	7.4.1.1(01)

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
[redacted]	1999	[redacted] Potential tumourigenic and chronic toxicity effects in prolonged dietary administration to hamsters. Date: 1999-03-30	[redacted]	No	Yes	BASF SE	6.5(02) / 6.7(02)
Cherednichenko, G et al	2012	Triclosan impairs excitation-contraction coupling and Ca2+ dynamics in striated muscle	Proc Natl Acad Sci USA. 28;109 (35): 14158-63	Yes	No	-	Non-key Published
[redacted]	1994a	Triclosan – Determination of aerobic bio-degradation in soils. Date: 12.04.1994	SLI Report #: [redacted] SLI Study #: [redacted]	No	Yes	BASF SE	7.2.1(02)
[redacted]	1994b	Triclosan – Determination of anaerobic aquatic biodegradation. Date: 14.04.1994	SLI Report #: [redacted] SLI Study #: [redacted]	No	Yes	BASF SE	7.1.2.1.2
Cooney, C.M.,	2010	Triclosan Comes under Scrutiny	Env. Health Perspect. 118(6), A242.	Yes	No		Non-key Published
Crofton, K.M., Paul, K.B., Hedge, J.M., DeVito, M.J.	2007	Short-term in vivo exposure to the water contaminant triclosan: evidence for disruption of thyroxine	Environ. Toxicol. Pharmacol. 24, 194-7.	Yes	No		Non-key Published
Dayan, A.D.	2007	Risk assessment of triclosan [redacted]®] in human breast milk	Food Chem. Toxicol. 45, 125-9	Yes	No		Non-key Published
[redacted]	2005	Calculation of the Bioconcentration Factor (BCF) of Triclosan. Date: 2006-11-02	Report No. [redacted]	No	Yes	BASF SE	7.4.2(01)

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
Federle, T.W., Kaiser, S.K. and Nuck, B.A.	2002	Fate and effects of Triclosan in activated sludge Date for acceptance: 2001-12-05	Environmental Toxicology and Chemistry, Vol. 21, No. 7 (2002), 1330-1337	Yes	No	-	7.1.2.1.1(03) Published 4.2 (non-key)
[redacted]	1990	Acute Toxicity of [redacted] to *Daphnia magna*. Date: 1990-07-25	Report-No. [redacted]	No	Yes	The Procter & Gamble Company	7.4.1.2(01)
[redacted]	1990	Report on NMR spectra, Triclosan Date: 1990-04-05	[redacted]	No	Yes	BASF SE	3.4(03)
[redacted]	1990	Report on density of solids, Triclosan Date: 1990-07-04	[redacted]	No	Yes	BASF SE	3.1(03)
[redacted]	1990	Report on vapour pressure curve, Triclosan. Date: 1990-11-05	[redacted]	No	Yes	BASF SE	3.2(01)
[redacted]	1983	90-Day Oral Toxicity Study in Rats with [redacted] Date: 1983-10-11	Project No. [redacted]	No	Yes	BASF SE	Non-key (A6.4.1)

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
Haddow, J.E., Palomaki, G.E., Allan, W.C., Williams, J.R., Knight, G.J., Gagnon, J., O`Heir, C.E., Mitchell, M.L., Hermos, R.J., Waisbren, S.E., Faix, J.D., Klein, R.Z.	1999	Maternal thyroid deficiency during pregnancy amd subsequent neurophysiological development of the child	N. Eng. J. Med. 341, 549-55	Yes	No		Non-key Published
[redacted]	2007 a	Statement regarding the solubility of triclosan in water and solvents. Date: 2007-04-19	[redacted]	No	Yes	BASF SE	3.5(01) 3.7(01) 3.9(01)
[redacted]	1990	Chromosome Aberration Assay in Chinese Hamster V79 Cells In Vitro with [redacted] Date: 1990-12-17	Project No. [redacted]	No	Yes	BASF SE	6.6.2
[redacted]	1997	Adsorption of ^{14}C-Triclosan to suspended solids. Date: 1997-04-22	Report #: [redacted]	No	Yes	BASF SE	Non-key (7.2.3.1)
[redacted]	1988	An Assessment of the Mutagenic Potential of Triclosan Using the Mouse Lymphoma TK Locus Assay. Date: 1988-09-15	ULR [redacted]	No	Yes	BASF SE ls	6.6.3

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
[redacted]	1997	Acute toxicity of Triclosan to *Scenedesmus subspicatus*. Date: 1997-02-21	Report-No. [redacted]	No	Yes	BASF SE	7.4.1.3(01)
[redacted]	1992	[redacted] Determination of effects on seedling growth of six plant species. Date: 1992-06-23	SLI Report #: [redacted] SLI Study #: 1[redacted]	No	Yes	The Procter & Gamble Company	7.5.1.3(02) Non-key
[redacted]	2006	Certificate of analysis. [redacted] Date: 2006-12-18 CONFIDENTIAL	--	No	Yes	BASF SE	3.3(01)
[redacted]	2007	Letter of confirmation for Ciba Specialty Chemicals concerning the stability of triclosan ref. the packaging material. Date: 2007-06-15	--	No	Yes	BASF SE	A3.17(01)
[redacted]	2007	Determination of the solubility of triclosan in water and solvents. Date: 2007-06-26	[redacted]	No	Yes	BASF SE	3.5(02) 3.7(02) 3.9(02)
[redacted]	1990 a	Report on dissociation constant in water, Triclosan. Date: 1990-09-13	[redacted]	No	Yes	BASF SE	3.6(01)
[redacted]	1988	Ames Metabolic Activation Test to Assess the Potential Mutagenic Effect of Triclosan. Date: 1988-09-09	ULR [redacted]	No	Yes	BASF SE	6.6.1
[redacted]	2006	Determination of Koc of Triclosan according to OECD TG 121. Date: 2006-11-21	Report No. [redacted]	No	Yes	BASF SE	7.1.3

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
[redacted]	2006 b	Determination of Koc of Methoxytriclosan and DCPP according to OECD TG 121. Date: 2006-11-14	Report No. [redacted]	No	Yes	BASF SE	7.1.3
[redacted]	2007	Mass spectrum of [redacted] Date: 2007-06-18 CONFIDENTIAL	Order No.: [redacted]	No	Yes	BASF SE	3.4(04)
Kumar, V., Chakraborty, A., Kural, M.R., Roy, P.	2009	Alteration of testicular steroidogenesis and histopathology of reproductive system in male rats treated with triclosan	Reprod. Toxicol. 27, 177-85.	Yes	No		Non-key Published
Lindström, A., Buerge, I.J., Poiger, Th., Bergqvist, P.-A., Müller, M.D. and Buser, H.-R.	2002	Occurrence and environmental behaviour of the bactericide Triclosan and its methyl derivative in surface waters and in wastewater	Environ. Sci. Technol. 36, 2322-2329	Yes	No	-	7.1.2.1.1(13) Non-key Published 4.2 non-key
[redacted]	1992	Assessing the removal of the test substance during secondary wastewater treatment: [redacted] Date: 1992-08-01	Report No. [redacted]	No	Yes	BASF SE	7.1.2.1.1(01)
[redacted]	1998	Assessing the removal of the test substance during secondary wastewater treatment: [redacted] Date: 1998-03-16	Report No. [redacted]	No	Yes	BASF SE	7.1.2.1.1(02)

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
McAvoy, D.C., Schatowitz, B., Jacob, M., Hauk, A., Eckhoff, W.S.	2002	Measurement of Triclosan in wastewater treatment systems.	Environ. Toxicology and Chemistry, Vol. 21, No. 7, 1323-1329	Yes	No	-	7.1.2.1.1(08) Non-key Published
[redacted]	2003	Inhibition of nitrification of activated sludge micro-organisms by [redacted] Date: 2003-07-28	Project no. [redacted]	No	Yes	BASF SE	7.4.1.4(03) Non-key
[redacted]	2006	Triclosan: Effects on the development of sediment-dwelling larvae of *Chironomus riparius* in a water-sediment system with spiked sediment. Date: 2006-07-17	Report-No. [redacted]	No	Yes	BASF SE	7.4.3.5.1(01)
[redacted]	1993	The Effects of [redacted] on Selected Biochemical and Morphological Liver Parameters Following Dietary Administration to Male Rats. Date: 1993-08-02	[redacted]	No	Yes	BASF SE	6.10(02)
Morrall, D., McAvoy, D., Schatowitz, B., Inauen, J., Jacob, M., Hauk, A. and Eckhoff, W	2004	A field study of triclosan loss rates in river water (Cibolo Creek, TX)	Chemosphere 54 (2004), 653-660	Yes	No	-	7.1.2.1.1(09) Non-key Published

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
[redacted]	1988	Two-Generation Reproduction Study in Rats – [redacted] Date: 1988-03-18	Study No. [redacted]	No	Yes	BASF SE	6.8.2
Moss, T. *et al.*	2000	Percutaneous Penetration and Dermal Metabolism of Triclosan (2,4,'4'-Trichloro-'2'-hydroxydiphenyl Ether)	*Food Chem. Toxicol.* 38, 361-370	Yes	No	–	6.2(02) Published
National Industrial Chemicals Notification and Assessment Scheme (NICNAS) under the Australian Government	2009	Triclosan, January 2009.	Priority Existing Chemical Assessment Report No. 30	Yes	No	-	- Non-key Published
Nielsen, E, Ostergard G, Larsen JC	2008	Toxicological risk assessment of chemicals: a practical guide	Informa Healthcare, ISBN Nummer ist: 9780849372650	?	?	?	Non-key Published
[redacted]	1969	[redacted] – Oral toxicity study in BABOONS (Repeated dosage for 4 and 13 WEEKS) Date: 1969-04-17	[redacted]	No	Yes	BASF SE	Non-key (6.3.1 / 6.4.1)
Nordic Biocide Group	2005	Biocides in wastewater and in sewage sludge.	Sponsored by the Nordic Council of Ministers, no project no.	Yes	No	-	7.1.2.1.1(15) Non-key

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
Nussbaum, K.	2007b	Packaging material for triclosan. Date: 2007-07-06	--	No	Yes	BASF SE	3.17(02)
Paul, K.B., Hedge, J.M., DeVito, M.J., Crofton, K.M.	2010	Developmental Triclosan Exposure Decreases Maternal And Neonatal Thyroxine in Rats	Environ. Toxicol. Chem. 29(12), 2840-4.	Yes	No	BASF SE	Non-key Published
Paul, K.B., Hedge, J.M., DeVito, M.J., Crofton, K.M.	2010	Short-term Exposure to Triclosan Decreases Thyroxine In Vivo via Upregulation of Hepatic Catabolism in Young Long-Evans rats	Toxicol. Sci. 113(2), 367-79.	Yes	No	BASF SE	Non-key Published
[redacted]	1993a	Triclosan [redacted] 14-Day Acute Oral LD_{50} Study in Bobwhite Quail. Date: 1993-04-19	Report-No. [redacted]	No	Yes	BASF SE	7.5.3.1.1(01)
[redacted]	1993c	'Triclosan ([redacted]: 8-Day Acute Dietary LC_{50} Study in Bobwhite Quail. Date: 1993-04-19	Report-No. [redacted]	No	Yes	BASF SE	7.5.3.1.2(01)
[redacted]	1990a	Report on melting point melting range, Triclosan Date: 1990-06-29	[redacted]	No	Yes	BASF SE	3.1(01)
[redacted]	1990b	Report on UV-VIS-absorption spectra, Triclosan Date: 1990-07-23	[redacted]	No	Yes	BASF SE	3.4(01)
[redacted]	1990c	Report on IR spectra, Triclosan Date: 1990-06-29	[redacted]	No	Yes	BASF SE	3.4(02)
[redacted]	1995	An 18-month oral oncogenicity study of triclosan in the mouse via dietary administration.	Study No. [redacted]	No	Yes	Colgate-Palmolive	Non-key (summary filed under 6.7)

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
[redacted]	1990a	Report on water solubility, Triclosan Date: 1990-07-10	[redacted]	No	Yes	BASF SE	3.5(03)
[redacted]	1990b	Report on hydrolysis as a function of pH. Date: 1990-07-10	[redacted]	No	Yes	BASF SE	7.1.1.1.1
[redacted]	1996	Early Life-Stage Toxicity of Triclosan to the rainbow trout (*Oncorhynchus mykiss*) under flow-through conditions. Date: 1996-11-27	Report-No. [redacted]	No	Yes	BASF SE	7.4.3.2(01)
Rodricks, J.V., Swenberg, J.A., Bozelleca, J.F., Maronpot, R.R., Shipp, A.m.	2010	Triclosan: A critical review of the experimental data and development margins of safety for consumer products	Critical reviews in toxicology, 2010,; 40(5): 422-484	Yes	No	-	Non-key Published
Rodríguez, P.E.A., Sanchez, M.S.	2010	Maternal exposure to triclosan impairs thyroid homeostasis and female pubertal development in Wistar rat offspring	J Toxicol Environ. Health, Part A. 73, 1678-88.	Yes	No	BASF SE	Non-key Published
Sabaliunas, D., Webb, S.F., Hauk, A., Jacob, M. and Eckhoff, W.S.	2003	Environmental fate of Triclosan in the River Aire Basin, UK.	Water Research 37 (2003), 3145-3154	Yes	No	BASF SE	7.1.2.1.1(06) Non-key Published
[redacted]	2007	Bulk density of triclosan ex [redacted] Date: 2007-06-22	--	No	Yes	BASF SE	3.1(04)
[redacted]	1995	Investigation of the Binding of [redacted] to Human, Hamster and Mouse Plasma Proteins in Vitro.	[redacted]	No	Yes	BASF SE	Non-key

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
Sanchez-Prado, L., Llompart, M., Lores, M., Garcia-Jazares, C., Bayona, J.M. and Cela, R.	2006	Monitoring the photochemical degradation of triclosan in wastewater by UV light and sunlight using solid-phase microextraction	*Chemosphere 65(8): 1338-1347*	Yes	No	-	7.4 Non-key Published
Sandborgh-Englund, G. *et al.*	2006	Pharmacokinetics of Triclosan Following Oral Ingestion in Humans.	*J. Toxicol. Environ. Health A*, 69:1861–1873	Yes	No	–	6.2(03)
[redacted]	1993	Rat Hepatocyte Primary Culture/DNA Repair Test on 39317 Date: 1993-06-24	[redacted]	No	Yes	BASF SE	6.6.5
[redacted]	1999	Triclosan in WWTP samples of Slough and Chertsey, UK. Date: 1990-07-10	Report-No. [redacted]	No	Yes	BASF SE	7.1.2.1.1(07) Non-key Published
[redacted]	2000	Bioakkumulation von 5-chloro-2-(2,4-dichlorophenoxy)-phenol ([redacted], Triclosan) bei unterschiedlichen pH-Werten des Wassers.	-	Yes	No	-	7.4.3.3.1(02) Non-key
[redacted]	1994	13-Week Oral Toxicity (Feeding) Study with [redacted] in the Hamster. Date: 1994-10-27	Project No. [redacted]	No	Yes	BASF SE	6.4.1(01)
[redacted]	1999	Inherent biodegradability of triclosan (Zahn-Wellens/EMPA test). Date: 1999-03-17	[redacted]	No	Yes	BASF SE	7.1.1.2.2(01)

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
[redacted]	1992 a	A Segment II Teratology Study with [redacted]. Date: 1992-04-16	Project No. [redacted]	No	Yes	BASF SE	6.8.1(01)
[redacted]	1992 b	A Segment II Teratology Study in Rabbits with [redacted]. Date: 1992-04-16	Project No. [redacted]	No	Yes	BASF SE	6.8.1(02)
[redacted]	1990	Report on thermal stability and stability in air, Triclosan Date: 1990-03-08	[redacted]T	No	Yes	BASF SE	3.10(01)
[redacted]	2001	Ambient monitoring method for triclosan ([redacted]) in air. Date: 2001-02-28	Document No.: [redacted]	No	Yes	BASF SE	4.2(02)
[redacted]	2007	Triclosan: Toxicity to activated sludge in a respiration inhibition test. Date: 2007-02-05	Report no. [redacted]	No	Yes	BASF SE	7.4.1.4(01)
Singer, H., Müller, S., Tixier, C. and Pillonel, L.	2002	Triclosan: Occurrence and fate of a widely used biocide in the aquatic environment: Field measurements in wastewater treatment plants, surface waters, and lake sediments.	Environ. Sci. Technol. 2002, 36, 4998-5004	Yes	No	-	7.1.2.1.1(04) Non-key Published 4.2 non-key
[redacted]	1993	Aqueous photolysis of Triclosan. Date: 1993-09-22	Project No. [redacted]	No	Yes	BASF SE	7.1.1.1.2(01)

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
Stoker, T.E., Gibson, E.K., Zorilla, L.M.,	2010	Triclosan Exposure Modulates Estrogen-Dependent Responses in the Female Rat	Tox. Sci. 117(1), 45-53	Yes	No		Non-key Published
[redacted]	1987	[redacted] – 28-Day Toxicity Study in Mice (Administration in Feed) with Special Reference to Histopathology. Date: 1987-03-31	Project No. [redacted]	No	Yes	BASF SE	6.3.1
Thompson, A., Griffin, P., Cartmell, E.	2005	The fate and removal of Triclosan during wastewater treatment.	Water Environment Research 77: 63-67	Yes	No	-	7.1.2.1.1(16) Non-key Published
Tixier, C., Singer, H.P., Canonica, S. and Müller, St.R	2002	Phototransformation of Triclosan in surface waters: A relevant elimination process for this widely used biocide - laboratory studies, field measurements, and modelling.	Environ. Sci. Technol. 2002, 36, 3482-3489	Yes	No	-	7.1.1.1.2(02)
[redacted]	1994	90-Day Subchronic Dermal Toxicity Study in the Rat with Satellite Group with [redacted] Date: 1994-07-14	[redacted]	No	Yes	BASF SE	6.4.2
[redacted]	1993	13-Week Subchronic Oral Toxicity Study of Triclosan in CD-1® Mice. Date: 1993-01-28	Project No. [redacted]	No	Yes	BASF SE	Non-key

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
[redacted]	1975	Skin Irritation in the Rabbit After Single Application of [redacted] Date: 1975-09-11	Project No. [redacted]	No	Yes	BASF SE	6.1.4(01)
[redacted]	1980 a	Acute Dermal LD50 in the Rabbit of [redacted] Date: 1980-07-02	Project No. [redacted]	No	Yes	BASF SE	6.1.2
[redacted]	1980 b	Eye Irritation in the Rabbit After Single Application of [redacted] Date: 1980-07-08	Project No. [redacted]	No	Yes	BASF SE	6.1.4(02)
U.S. Environmental Protection Agency	2010	Triclosan Facts	Available: http://www.epa.gov/oppsrrd1/REDs/factsheets/triclosan_fs.htm (accessed 3 November 2010)	Yes	No		Non-key Published
U.S. Food and Drug Administration	2010	Triclosan: What Consumers Should Know	Available: http://www.fda.gov/forconsumers/consumerupdates/ucm205999.htm (accessed 3 November 2010)	Yes	No		Non-key Published
[redacted]	1994	^{14}C-Triclosan: Absorption, Distribution, Metabolism and Elimination after Single/Repeated Oral and Intra-venous Administration to Hamsters. Date: 1994-11-11, amended 1995-02-10 and 1995-08-25	Project No. [redacted]7	No	Yes	BASF SE	6.2(01)

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
[redacted]	1995	^{14}C-Triclosan: Absorption, Distribution, Metabolism and Elimination after Single/Repeated Oral and Intra-venous Administration to Mice. Date: 1995-03-01, amended 1995-05-12	Project No. [redacted]	No	Yes	BASF SE	Non-key
[redacted]	1996	^{14}C-Triclosan: Absorption, Distribution and Excretion after Single Oral and Repeated Oral Administration to Male Rats. Date: 1996-07-17	Project No. [redacted]8	No	Yes	BASF SE	6.2(04)
Veldhoen, N., Skirrow, R.C., Osachoff, H., Wigmore, H., Clapson, D.J., Gunderson, M.P., Van Aggelen, G., Helbing, C.C.	2006	The bactericidal agent triclosan modulates thyroid hormone-associated gene expression and disrupts postembryonic anuran development	Aquat. Toxicol. 80, 217-27.	Yes	No		Non-key Published
[redacted]	2007a	The Effects of Triclosan on Soil Respiration. Date: 2007-02-21	Report No. [redacted]	No	Yes	BASF SE	7.5.1.1(01)
[redacted]	2007b	The Effects of Triclosan on Soil Nitrification. Date: 2007-02-21	Report No. [redacted]	No	Yes	BASF SE	7.5.1.1(02)

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
[redacted]	1991	Chromosome Aberration Assay in Bone Marrow Cells of the Rat with [redacted] Date: 1991-04-23	Project No. [redacted]	No	Yes	BASF SE	6.6.4
[redacted]	1998 a	In Vitro Human Skin Penetration and Distribution of ^{14}C-Labelled Triclosan from a Deodorant Formulation. Date: 1998-10-08	C[redacted]	No	Yes	BASF SE	Non-key
[redacted]	1998 b	In Vitro Human Skin Penetration and Distribution of ^{14}C-Labelled Triclosan from a Dishwashing Liquid. Date: 1998-10-08	[redacted]8	No	Yes	BASF SE	Non-key
[redacted]	1998 c	In Vitro Human Skin Penetration and Distribution of ^{14}C-Labelled Triclosan from a Soap Solution. Date: 1998-10-08	[redacted]	No	Yes	BASF SE	Non-key
[redacted]	2007 a	Study Plan. [redacted] (Triclosan), Determination of the flammability and evaluation of the flammability in contact with water and pyrophoric properties. Date: 2007-07-06	[redacted]	No	Yes	BASF SE	3.11(01)
[redacted]	2007 b	Study Plan. FAT [redacted] (Triclosan), Determination of the relative self-ignition temperature. Date: 2007-07-06	[redacted]	No	Yes	BASF SE	3.11(02)

Authors (s)	Year	Title	Report No.	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner	Section No. in Doc III-A / Non.key study / Published
[redacted]	1994 a	Acute Oral Toxicity Limit Test. Date: 1994-03-11	Study No. [redacted]	No	Yes	BASF SE	6.1.1
[redacted]	1994 b	Dermal Sensitization Test – Buehler Method. Date: 1994-04-04	Study No. [redacted]	No	Yes	BASF SE	6.1.5
[redacted]	1990 a	48-hour acute toxicity of [redacted] to *Daphnia magna* (OECD-Immobilisation test). Date: 1990-11-09	Project-No. [redacted]	No	Yes	BASF SE	7.4.1.2(03) Non-key
[redacted]	1990 b	Influence of [redacted] on the reproduction of *Daphnia magna*. Date: 1990-09-10, revision date: 1995-05-16	Project-No. [redacted]	No	Yes	BASF SE	7.4.3.4(01)
Wüthrich, V.	1990 c	Acute toxicity (LC50) study of [redacted] to earthworms. Date: 1990-07-05	Report-No. [redacted]	No	Yes	BASF SE	7.5.1.2(01)
[redacted]	1986	[redacted] – 2-Year Oral Administration to Rats [redacted] Date: 1986-04-28	[redacted]	No	Yes	BASF SE	6.5(01) / 6.7(01)
Zorilla, L.M., Gibson, E.K., Jeffay, S.C., Crofton, K.M., Setzer, W.R., Cooper, R.L., Stoker, T.E.	2009	The effects of triclosan on puberty and thyroid hormones in male Wistar rats.	Toxicol. Sci. 107, 56-64.	Yes	No		Non-key Published