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

Evaluation of active substances

Assessment Report

Biphenyl-2-ol

Product-type PT 6
(Preventol O Extra & Preventol ON Extra Preservative Solution)

July 2015

Spain

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 [Biphenyl-2-ol] as Product-type [6] (Preservatives for products during storage), 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.

Biphenyl-2-ol (CAS no. 90-43-7) was notified as an existing active substance, by LANXESS Deutschland GmbH and DOW Benelux B. V., hereafter referred to as the applicant, in Product-type 6.

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, Spain 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 Biphenyl-2-ol as an active substance in Product-type 6 was 31st July 2007, in accordance with Annex V of Regulation (EC) No 1451/2007.

On 12th July 2007, Spanish competent authorities received a dossier from the applicant. The Rapporteur Member State accepted the dossier as complete for the purpose of the evaluation on 31st October 2008.

On 2nd June 2014, 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 [Biphenyl-2-ol] for Product-type 6, 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

This evaluation covers the use of Biphenyl-2-ol in Product-type 6, but it does not cover sodium 2-biphenylate and potassium 2-biphenylate. The most important mechanism is the interaction with bio-membranes. In the first step an adsorption of Biphenyl-2-ol to the cell membrane takes place. The greater the proportion of undissociated molecules of the biocide in the surrounding medium the stronger will be the adsorption. In further steps the function of membrane proteins is disturbed, substrate transport and ATP synthesis are inhibited. The cell membrane loses its semi-permeability and ions and organic molecules escape.

Specifications for the reference source are established.

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

Validated analytical methods are available for the determination of Biphenyl-2-ol as manufactured and for the analysis of impurities. Validated analytical methods are also available for the determination of Biphenyl-2-ol in soil, water, air and food/feeding stuffs matrices. Other analytical methods are not required because Biphenyl-2-ol is not classified as toxic or highly toxic.

2.1.2. Intended Uses and Efficacy

The assessment of the biocidal activity of the active substance demonstrates that it has a sufficient level of efficacy against the target organisms and the evaluation of the summary data provided in support of the efficacy of the accompanying product, establishes that the product may be expected to be efficacious.

Biphenyl-2-ol and Biphenyl-2-ol Solution (17.7% active substance Biphenyl-2-ol in alkaline solution) are a multi-site bactericide and fungicide with basic activity at the cell wall, disruption of membrane potentials and general membrane permeability of cytoplasmic membrane.

Biphenyl-2-ol and Biphenyl-2-ol in alkaline solution have a broad efficacy against bacteria, e.g. *Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa, Pseudomonas fluorescens, Pseudomonas oleovorans, Pseudomonas rubescens, Pseudomonas stutzeri, Alcaligenes faecalis, Citrobacter freundii* and *Corynebacterium sp*.

The efficacy tests were performed according to an internal method by Lanxess Deutschland. The tests demonstrate the efficacy of the product against bacteria. The three efficacy tests were considered relevant to the evaluation for PT 6. The test periods were: 3, 5 and 6 weeks; one contamination per week. Efficacy against fungi and yeasts should be demonstrated at product authorisation stage.

Due to the unspecific mode of action (multi-site activity) a development of resistance against biocidal use of Biphenyl-2-ol is not expected.

Regarding the intended uses, the biocidal products evaluated correspond to:

- PT 6.01: In can preservative for detergents and household cleaning products:

  Biphenyl-2-ol and Biphenyl-2-ol in alkaline solution are antimicrobial preservatives for aqueous products. The aim of the application of In-can preservatives is the preservation of manufactured products in cans, tanks or other closed containers. Thus, bio-spoilage during the shelf life of the product is avoided. Concentration in preserved products is 0.1% to 0.5% w/w Biphenyl-2-ol.

- PT 6.02: Preservation of paper additives:

  Aqueous suspensions of inorganic minerals are known to provide a suitable environment for the growth of micro-organisms. Aerobic organisms are supported by oxygen that is introduced through mixing or pumping. Addition of chemicals which are required for processing can serve as nutrients and as source for microbiological contamination. Areas that are not circulated tend to become anaerobic, supporting the growth of anaerobic micro-organisms. The product is added to the suspension/solution at a final concentration of 225 ppm Biphenyl-2-ol.

In addition, in order to facilitate the work of Member States in granting or reviewing authorisations, the intended uses of the substance, as identified during the evaluation process, are listed in Appendix II.

2.1.3. Classification and Labelling

CURRENT CLASSIFICATION

Classification according to the CLP Regulation		
Hazard Class and Category Codes	Eye Irrit. 2 Skin Irrit. 2 STOT SE 3 Aquatic Acute 1	H319 H315 H335 H400
Labelling		
Pictograms	GHS07 GHS09 Wng	
Signal Word	Warning	
Hazard Statement Codes	H319: Causes serious eye irritation H315: Causes skin irritation H335: May cause respiratory irritation H400: Very toxic to aquatic life	
Specific Concentration limits, M-Factors		

PROPOSED CLASSIFICATION

The proposed classification and labelling for Biphenyl-2-ol according to Regulation (EC) No 1272/2008 (CLP Regulation) is:

Classification according to the CLP Regulation		
Hazard Class and Category Codes	Eye Irrit. 2 Skin Irrit. 2 STOT SE 3 Carc 2	H319 H315 H335 H351

	Aquatic Acute 1 Aquatic Chronic 1	H400 H410
Labelling		
Pictograms	GHS07 GHS09 Wng	
Signal Word	Warning	
Hazard Statement Codes	H319: Causes serious eye irritation H315: Causes skin irritation H335: May cause respiratory irritation H351: Suspected of causing cancer H400: Very toxic to aquatic life H410: Very toxic to aquatic life with long lasting effects	
Specific Concentration limits, M-Factors		

2.2. Summary of the Risk Assessment

2.2.1. Human Health Risk Assessment

2.2.1.1. Hazard identification

Toxicokinetics and metabolism

A study was conducted in six human volunteers (males) to determine the degree of dermal absorption (Selim 6.2-03). The mean total absorption was 43.19. For the purpose of risk assessment in this dossier 43.19% dermal absorption of Biphenyl-2-ol through the skin will be applied. The mean total absorption, defined as the compound-related radioactivity present in the urine, feces (excluding tape strips) was 43.15% (concentration 0.4% ≅ 0.006 mg Biphenyl-2-ol /kg bw). This indicates that the ^{14}C- Biphenyl-2-ol derived radioactivity did not accumulate in the superficial layers of the skin.

A dermal study was conducted in six human volunteers (males) to obtain information on the metabolism of Biphenyl-2-ol (Bartels 6.2-01). Metabolites of Biphenyl-2-ol present in the urine samples from the study 6.2-03 were characterized. The major urinary metabolite was found to be the sulphate conjugate of Biphenyl-2-ol, accounting for 68.33% of the absorbed dose. Conjugation of Biphenyl-2-ol with glucuronic acid was less significant, accounting for only 3.46% of the absorbed dose. Hydroxylation of the phenol or phenyl ring, followed by conjugation was also shown to be significant, with phenylhydroquinoneglucuronide and 2,4'-dihydroxybiphenyl-sulfate representing 14.34% and 12.35% of the absorbed dose, respectively. Trace levels of unmetabolized parent compound (0.50% of absorbed dose) were found in early time interval samples only. No free phenylhydroquinone or phenylhydroquinone-sulphate were found in any of the urine samples (limit of detection = 0.25-0.59% absorbed dose). Biphenyl-2-ol, both free and conjugated, accounted for 73.0% of the total absorbed dose following dermal exposure to 0.4 mg test material for 8 h.

A study was conducted to determine the degree of oral absorption and to obtain information on the metabolism of ^{14}C-Biphenyl-2-ol in the B6C3F1 mouse ([redacted] 6.2-02). The mean total absorption for the mice treatment groups, defined as the compound-related radioactivity present in the urine, faeces, tissues and carcass was 95-104% (concentration 25mg/kg and 1000 mg/kg). This suggests a low potential for bioaccumulation. The excretion of ^{14}C-Biphenyl-2-ol was rapid and complete by 12 - 24 h post-dosing with 74 - 98% of the recovered radioactivity in the urine and 6 - 13% in the faeces

An ADME study was conducted to obtain information on the metabolism of ^{14}C-Biphenyl-2-ol in the B6C3F1 mouse and Fischer rats ([redacted] 6.2-02). In mice Biphenyl-2-ol was completely metabolized and rapidly eliminated via the urine predominantly as a sulphate and glucuronide conjugate of Biphenyl-2-ol. Qualitatively the extent of metabolism was comparable between mice and rats, although quantitative differences in the extent of Biphenyl-2-ol sulphation and glucuronidation were seen between these species. Binding to macromolecules or conjugation

with intracellular glutathione occurs very rapidly thereby preventing the substance from being detectable or appearing free in the plasma.
No specific study of inhalation absorption of Biphenyl-2-ol is available.

Products of degradation (photolysis) in laboratory simulated ground waters
In laboratory experimental tests, it was observed that bisphenol-2-ol is degraded by photolysis in water (See Doc IIA, point 4.1.1.1.2 and 4.4) Two products of degradation are formed, benzoic acid and a diketohydroxy-compound, being this the higher proportion (maximum observes 13.7% of the Biphenyl-2-ol at day 1. The presence of these products is expected to be transiently as they are also quickly photodegraded.

In a QSAR evaluation, the environmental formation was predicted and also predicted lower toxicity than for Biphenyl-2-ol to aquatic media. Therefore, exposure and adverse effects in the aquatic media have been considered to be negligible and that the risk covered by the risk evaluated for the Biphenyl-2-ol. The risk of exposure for Biphenyl-2-ol and metabolites is considered negligible to aquatic media. Therefore it is still less likely the exposure to human to the product of transformation via the drinking water. In any case, the risk may be covered by the assessment of the Biphenyl-2-ol parent compound.

Therefore, additional toxicological information of this "products of transformation" (photolysis) is in principle not required as exposure to human via drinking water is expected to be negligible and risk may be covered from the assessment of parent compound. Nevertheless, it may be reasonable requiring performing an assessment for predicting the relative toxicity by read across from other similar substances in mammals, if enough information from similar substance is available.

Oral, dermal and inhalation absorption
A study was conducted in six human volunteers (males) to determine the degree of dermal absorption (Selim 6.2-03). The mean total absorption was 43.19. For the purpose of risk assessment in this dossier 43% dermal absorption of Biphenyl-2-ol through the skin will be applied.
A study was conducted to determine the degree of oral absorption and to obtain information on the metabolism of ^{14}C-Biphenyl-2-ol in the B6C3F1 mouse ([redacted] 6.2-02). The mean total absorption for the mice treatment groups, defined as the compound-related radioactivity present in the urine, faeces, tissues and carcass was 95-104% (concentration 25 mg/kg and 1000 mg/kg). For the purpose of risk assessment in this dossier 100% oral absorption of Biphenyl-2-ol will be applied.
No specific study to determine the inhalation absorption of Biphenyl-2-ol is available. For inhalation application of Biphenyl-2-ol 100% absorption is assumed for risk characterization.

Acute toxicity
The oral acute toxicity was evaluated in the available document Gilbert 6.1.1-01. Under the conditions of this study, the acute oral LD_{50} of Dowicide 1 Antimicrobial (99.9% Biphenyl-2-ol) for male and female Fischer 344 rats was 2733 mg/kg (2730.3 mg Biphenyl-2-ol/kg), by nonlinear interpolation.
The dermal acute toxicity was evaluated in the available document Bomhard 6.1.2-01. The LD_{50} values for male and female rats were greater than 2000 mg/kg body weight and were not exactly determined.
The acute inhalation toxicity was evaluated in the available document Landry 6.1.3-01a. The LD_{50} values for male and female Fischer rats were greater than 36 mg/m^3 (0.036 mg/L) and were not exactly determined because the highest test atmosphere that could be generated was 0.036 mg/L, which is too low to provide an accurate determination (Landry 6.1.3-01b).

Irritation and Corrosivity
Biphenyl-2-ol is currently classified as Skin Irrit. 2 (H315: Causes skin irritation). The skin irritation was evaluated in the available document Gilbert 6.1.4-01/1981a in New Zealand White rabbits.
Biphenyl-2-ol is currently classified as Eye Irrit. 2 (H319: Causes serious eye irritation). To investigate eye irritation properties of Biphenyl-2-ol a test in the eye of albino rabbit was

performed ([redacted] 6.1.4-01/1981b).
Based on the weight of evidence from existing information, it can be reasonably concluded that the substance is moderately irritant to the eye and because of its proven irritant effects on mucosa, it can be reasonably assumed that Biphenyl-2-ol is irritating to the airways when inhaled in high concentrations (e.g. pure substance dust) then it is classified as STOT SE 3 (H335: May cause respiratory irritation).

Sensitisation
Biphenyl-2-ol was tested for its skin sensitisation potential in Buehler test on Guinea pigs ([redacted] 6.1.5-01/1994b) with Dowicide 1 Antimicrobial (99.9% Biphenyl-2-ol). The animals were in apparent good health and gained weight over the study period. Therefore, under the conditions of this study, Dowicide 1 Antimicrobial (99.9% Biphenyl-2-ol) did not cause delayed contact hypersensitivity in guinea pigs.
A paper is submitted where Biphenyl-2-ol was tested for its skin sensitisation potential in Magnusson-Kligman test on Guinea pigs (Andersen 6.1.5-02) with Preventol O Extra (Biphenyl-2-ol concentration ≥ 99.5 %). No animals were sensitized by Preventol O Extra.

In humans there are some case reports indicating positive patch test reactions in dermatological patients. Important data for humans is available from a volunteer study showing clearly negative results. See below section of "Human Data" and Table 2.2.1.1 1.

The overall conclusion is that biphenyl-2-ol is not skin sensitizer in humans.

Repeated dose toxicity
Biphenyl-2-ol was examined in a 21-day dermal study ([redacted] 6.3.2-01a) in Fischer 344 rats, in a 28-day oral study with Dog Beagle ([redacted] 6.3.1-01, 6.5-02), in a 91-day oral study ([redacted] 6.4.1-01a) in male Fischer rats, in a 1-year oral study in dog ([redacted] 6.3.1-01, 6.5-02) and a 2-years oral study in Fischer rats ([redacted] 6.5-01a, 6.7-01a).
The NO(A)EL for dermal exposure in a 21-day dermal study in Fischer rat is 1000 mg/kg bw/day on the basis of the no systemic effects in any dose group.
The NO(A)EL for oral exposure in a 28-day oral study in dog Beagle is 300 mg/kg bw/day on the basis of the no adverse effects in any dose group.
The NO(A)EL for oral exposure in a 91-day oral study in male Fischer is 224 mg/kg/day (4000 ppm) on the basis of the urothelial hyperplasia and the necrotic foci in the bladders in the highest dose.
The NO(A)EL for oral exposure in a 1-year oral study in dog is 300 mg/kg/day on the basis of the no adverse effects in any dose group.
The NO(A)EL for oral exposure in a 2-year oral study in Fischer rats is 39 mg/kg/day on the basis of the increased incidence of simple urinary bladder hyperplasia in males and the increased incidence of urinary bladder transitional cell carcinoma in males.
No specific studies for subchronic and chronic dermal toxicity and for short, subchronic and chronic inhalation toxicity are available

Genotoxicity and carcinogenicity
Genotoxicity
In-vitro
The results of the Salmonella/Mammalian-Microsome Plate Incorporation Mutagenicity Assay (San 6.6.1-01) indicate that under the conditions of this study, a positive response was not observed with any of the tester strains either in the presence or absence of microsomal enzymes prepared from Aroclor induced rat and hamster liver.
The test substance Preventol O Extra (99.9 % Biphenyl-2-ol) is considered to be non mutagenic in the CHO-HGPRT Forward Mutation Assay, (Brendler 6.6.3-01) both with and without metabolic activation.
Biphenyl-2-ol was clastogenic in Chinese hamster ovary cells at cytotoxic concentrations. In the presence of S9 mix, phenylhydroquinone (metabolite produced from Biphenyl-2-ol) is formed which has a higher cytotoxic and clastogenic potential than Biphenyl-2-ol (Tayama

6.6.2-01).
In-vivo
Preventol O Extra (99.9 % Biphenyl-2-ol) was evaluated as non-genotoxic in the in vivo comet assay in hepatocytes and kidney cells of male mice ([redacted] 6.6.5-01).
Carcinogenicity
The carcinogenicity was examined in two combined chronic toxicity/oncogenicity testing studies:

- In the rat Fischer 344 ([redacted] 6.5-01a, 6.7-01a), where the urinary bladder showed evidence of a compound-induced neoplasia in the highest doses (male animals only). It was considered border-line at 4000 ppm (200 mg/kg body wt/day) as there was only a marginal and non-statistical increase in both urinary bladder hyperplasia and transitional cell carcinoma when compared to controls or 800-ppm males (39 mg/kg body wt/day). Evidence of a compound-induced neoplasia was not observed in female animals at any dose tested.
- In B6C3F1 mice ([redacted] 6.7-02a), where A statistically significant increased incidence of hepatocellular adenomas was observed in male mice of the 500 and 1000 mg/kgBW/day groups (in the middle and high dose groups) . There were no significant increases in tumours in female mice fed Biphenyl-2-ol.

For Biphenyl-2-ol there is convincing evidence that the carcinogenetic effects shown in rodents are threshold effects with an indirect and non-genotoxic mechanism and tumours observed in rodent species (liver tumours in mice and bladder tumours in rats) are not predictive of carcinogenicity for humans due to proven species differences. Based on the criteria for classification of Directive 2001/59/EC, liver tumours in sensitive strain of mice are not of relevance for classification.

In the WG and in the ad hoc follow up process for discussing the AF is was discussed the relevant of tumours for humans. The no relevant of the liver tumours in mice was agreed.
The bladder tumour observed in male rats has been discussed in deep in Doc IIA and considering the special studies related with the use of biphenol-2-ol in alkaline conditions
There are evidences suggesting that these tumours in male rats are not relevant to human as the MOA is related with special sensitivity to alkalinisation in male rat bladder. However three ad hoc follow-up participants considered that the mechanisms of bladder tumour formation is not completely known and the relevance of these tumours for humans cannot be completely excluded. Therefore, biphenyl-2-ol may be classified as carcinogen Cat 2.

Reproductive and developmental toxicity
The teratogenicity of the Biphenyl-2-ol is examined in two studies:
(1) in Wistar rats ([redacted] 6.8.1- 01)
(2) in New Zealand White rabbits ([redacted] 6.8.1-02).

The relevant NOAEL for **maternal toxicity** adopted was **100 mg/kg bw/day** on the basis of the increased mortality (13%) in New Zealand White rabbits, gross pathologic alterations (ulceration and haemorrhage of the gastric mucosa, haemolysed blood in the intestinal tract and decreased ingesta) and histopathologic alterations (renal tubular degeneration and inflammation). The relevant NOAEL for **teratogenic toxicity** adopted was **250 mg/kg bw/day** (the highest assayed dose).on the basis of no adverse embryonal/fetal effects were observed at any dose level tested in New Zealand White rabbits
Two two-generation studies examined the impact of Biphenyl-2-ol in fertility in Sprague-Dawley rats (Eigenberg 6.8.2-02a and Eigenberg 6.8.2-01). The NOAEL for parental toxicity in rats is 35 mg/kg bw/d in males and females, based on the incidence of urothelial hyperplasia and calculi in the kidney and/or urinary bladder was increased in male rats. The NOAEL for development (F1) is 457 mg/kg bw/d in males and females, based on no adverse effects in any dose group

Neurotoxicity
Biphenyl-2-ol does not belong to a class of compounds for which a neurotoxic potential can be expected. In addition the available toxicity studies gave no indication of any relevant neurotoxic potential of the compound.

Human data

A short report entitled "Occupational medical experiences with Biphenyl-2-ol" is submitted (Heyne 6.12.1-01; no GLP). Occupational medical surveillance of workers exposed to Biphenyl-2-ol, performed every 3 years on a routine basis. The workers have been in the production of Biphenyl-2-ol in average for 13,9 years. During this period accidents with Biphenyl-2-ol or unwanted contamination with Biphenyl-2-ol haven't been recorded and consultations of the Medical Department due to work or contact with Biphenyl-2-ol haven't been required. The Phenol-levels in urine have always been far below German biological tolerance level of 200 mg/L (formerly 300 mg/L). Biphenyl-2-ol did not reveal any unwanted effects in the workers. Especially no sensitization of airways or skin to Biphenyl-2-ol has occurred. The examinations have included the above laboratory parameters as well as clinical and technical examinations.

A short communication is submitted (Adams 6.12.6-01) where it is described two cases of allergic contact dermatitis due to occupational contact with Biphenyl-2-ol containing products. In both patients the dermatitis was extensive and severe. In the case 1, a 34-year-old medical laboratory assistant applied a common over-the-counter "medicated" cream to various parts of his body for "dry skin". Patch testing with the cream and Biphenyl-2-ol in 0.5% and 1% concentrations showed strong positive reactions at 72 h. In the case 2, a 57-year-old male machinist had experienced a recurring dermatitis on the hands, arms, trunk, thighs and feet for 25 years. A patch testing revealed a positive reaction to 1% *o*-Pheny1phenol in petrolatum, and a positive "provocative use test" from a suspected coolant which contained this preservative.

A short communication is submitted (Van Hecke 6.12.6-02) where it is described a case of allergic contact dermatitis due to occupational contact with Biphenyl-2-ol containing products. A 24-year-old machinist had had dermatitis of the hands for 10 months due to a coolant and a cleanser.

A paper is submitted (Schnuch 6.12.6-03) where it is examined the role of different preservatives in a large number of patients with suspected allergic contact dermatitis. Patch test data and data from the patients' history were collected from the 24 departments participating in the Information Network of Departments of Dermatology from 1 January 1990 to 31 December 1994. Patch test data from 28349 patients tested with preservatives of the standard series (SS), from 11485 patients tested additionally with a preservative series (PS), and from 1787 patients tested with an industrial biocide tray (IB) were evaluated. Nine of 24 centers applied patch tests for 24 h, the remainder (15 of 24) for 48 h. Readings were done at 72 h after application of the test chambers. The PS and IB contained Biphenyl-2-ol at a concentration of 1% in petrolatum. Of 11418 subjects tested, 59 showed an irritant or questionable result, 33 (0.3%) were positive in PS. Of 1785 subjects tested, 5 showed an irritant or questionable result, 5 (0.4%) were positive in IB.

A paper is submitted (Brasch 6.12.6-05) where the main purpose was to identify the most frequent contact allergens and reconsider the test concentrations. This study is a retrospective evaluation of patch test results with medical antimicrobials and preservatives, performed by eight centres of the IVDK (Informations verb und Dermatolocischer Kliniken) from 1989 to 1991. It was evaluated the patch test results and questionnaires of 2059 patients tested with a preliminary series of medical antimicrobials and preservatives where Biphenyl-2-ol was included. This series was tested in patients clinically suspected to suffer from contact allergy to preservatives. Of 2043 subjects tested with Biphenyl-2-ol (at a concentration of 1% in petrolatum), 6 showed a medium positive reaction, 8 an equivocal reaction and one an irritant reaction.

A paper is submitted (Geier 6.12.6-04) where 1132 patients were patch tested with a variety of "antiseptics/industrial chemicals". Biphenyl-2-ol was one of the test compounds. Biphenyl-2-ol was applied as a 1% solution in petrolatum. Of 1131 patients tested with Biphenyl-2-ol, 5 individuals (0.4%) showed positive reactions. One individual showed ambiguous results.

Other no critic studies with complementary information which does not contradict the results of the key studies are included in the next table.

Table 2.2.1.1-1: Effects of Biphenyl-2-ol in Humans

Doc IIIA Section No.	Type	Description	Results	Reference
6.12.1 Key study	Surveillance of manufacturing plant personnel	Medical surveillance of personnel involved in Biphenyl-2-ol production No. of workers exposed: 73 (2 ♀, 71 ♂) in average 13.9 years of medical supervision	No adverse effects. No airway or skin sensitisation towards Biphenyl-2-ol has occurred.	Heyne 6.12.1 (01)
6.12.6 Key study	Clinical cases	Two cases of allergic contact dermatitis due to occupational contact with Biphenyl-2-ol containing products (1) germicidal agent (2) coolant	allergic contact dermatitis in both cases due to Biphenyl-2-ol	Adams 6.12.6 (01)
6.12.6 Key study	Clinical case	One case of sensitivity to Biphenyl-2-ol due to occupational contact to a coolant containing Biphenyl-2-ol	Contact sensitivity to Biphenyl-2-ol in a coolant	Van Hecke 6.12.6 (02)
6.12.6 Key study	Multi-centre study	Patch tests on patients with suspected contact dermatitis. 11485 patients were tested additionally with a preservative series (PS) and 1785 were tested with an industrial biocide tray (IB). Occupational exposure was suspected in 17% of the cases	59 of 11418: irritative or questionable result in PS 33 of 11418: positive reaction in PS 5 of 1785: irritative or questionable result in IB 7 of 1785: positive reaction in IB	Schnuch 6.12.6 (03)
6.12.6 Key study	Study	retrospective study patch tests 1 % Biphenyl-2-ol was applied	6 of 2043: medium positive reaction 8 of 2043: equivocal reaction 1 of 2043: irritant reaction	Brasch 6.12.6 (05)
6.12.6 Key study	epidemiological study	1132 patients were patch tested with a variety of "antiseptics/industrial chemicals". Biphenyl-2-ol was one of the test compounds.	Of 1131 patients tested with Biphenyl-2-ol, 5 individuals (0.4%) showed positive reactions. One individual showed ambiguous results	Geier 6.12.6 (04)

Table 2.2.1.1-1: Effects of Biphenyl-2-ol in Humans

Doc IIIA Section No.	Type	Description	Results	Reference
6.12.6	Epidemiological study	Epidemiological study on metal workers. Patch tests with 1% Biphenyl-2-ol. 40 workers were tested. 39 of them presented with dermatitis of hands and/or forearms. 5 had incidences of dermatitis in the past.	Biphenyl-2-ol was not a contact allergen in any of the cases.	De Boer 6.12.6 (08)
6.12.6	epidemiological study	Epidemiological study on 424 metalworkers who were exposed to metal working fluid. Patch tests with 1% Biphenyl-2-ol on 277 patients.	2 of 277: positive reaction	Uter 6.12.6 (06)
6.12.1	Surveillance of manufacturing plant personnel	Regular medical examination and urine biomonitoring.	Medicinal surveillance and biomonitoring did not reveal findings of concern.	6.12.1 (02)

Other/special studies

A paper is submitted (Fukushima 6.10-01/AIII 6.10-1) where the effects of sodium biphenyl-2-olate (OPP-Na) and Biphenyl-2-ol on two-stage urinary bladder carcinogenesis in male F344 rats initiated with *N*-butyl-*N*-(4-hydroxybutyl)nitrosamine (BBN) were investigated. OPP-Na acts as a tumour promoter in the urinary bladder following initiation by BBN. OPP-Na alone also induced tumour formation in the urinary bladder and can therefore be considered a weak initiator in the two-stage model of carcinogenesis and a complete carcinogen. Biphenyl-2-ol had no significant tumour-promoting or initiating effects. The increase in urinary pH caused by OPP-Na but not by Biphenyl-2-ol might cause the difference in the carcinogenic potential of the two compounds.

A paper is submitted (Fujii 6.10-03/ AIII 6.10-2) where the effects of an alkalizer or an acidifier on bladder carcinogenesis induced by Biphenyl-2-ol or OPP-Na were examined. The results indicate that the administration of an alkalizer enhanced the carcinogenicity of Biphenyl-2-ol and the administration of an acidifier inhibited the carcinogenicity of OPP-Na to the rat urinary bladder. This suggests that the earlier finding that OPP-Na was more carcinogenic than Biphenyl-2-ol resulted from the higher alkalinity of OPP-Na.

A study is submitted ([redacted] 6.10-15/ AIII 6.10-3; no guideline; no GLP) where the possible role of prostaglandin-*H*-synthase (PGHS) in Biphenyl-2-ol-induced bladder tumour formation is investigated. Biphenyl-2-ol and phenylhydroquinone (PHQ) stimulate cyclooxygenase activity and are oxidised by PGHS. Biphenyl-2-ol, PHQ and 2-phenyl-1,4-benzo-quinone (PBQ) inhibit PGHS at higher concentrations.

Other no critic studies with complementary information which does not contradict the results of the key studies are included in the Table 2.2.1.1-2.

These effects of concern observed with Na/K salts (or Biphenyl-2-ol in alkaline condition) should be considered in the evaluation of the hazard and risk of products formulated or used in dilution in alkaline conditions.

Table 2.2.1.1-2: Other/special studies with Biphenyl-2-ol

Type of study	Dosage	Results	Reference

Table 2.2.1.1-2: Other/special studies with Biphenyl-2-ol

Type of study	Dosage	Results	Reference
32-week, dietary, rats Key study	20000 ppm, with and without tumour initiator *ad libitum*	Biphenyl-2-ol had no significant tumour-promoting or -initiating effects in the urinary bladder.	[redacted] 6.10 (01)/AIII 6.10 (1)
26-week, dietary, rats Key study	12500 ppm, with/without $NaHCO_3$ *ad libitum*	Urinary bladder tumourigenesis of Biphenyl-2-ol is enhanced by $NaHCO_3$.	[redacted]6.10 (03)/ AIII 6.10 (2)
In-vitro interaction with PGHS Key study	Biphenyl-2-ol, PHQ, PBQ: 100 µM	Biphenyl-2-ol and PHQ stimulate cyclooxygenase activity and are oxidised by PGHS.Biphenyl-2-ol, PHQ and PBQ inhibit PGHS at higher concentrations.	[redacted] 6.10 (15)/ AIII 6.10 (3)
32-week, dietary, rats	12,500 ppm, with varying amounts of $NaHCO_3$ *ad libitum*	Morphological changes of the bladder epithelium, correlating with increased urinary pH.	[redacted] 6.10 (01)
32-week, dietary, rats	20,000 ppm, *ad libitum*	Reduced urinary osmolality. Increased pH and Na^+ correlate with tumourigenesis.	[redacted] 6.10 (04)
12-week, dietary, rats	0, 2500, 5000, 10,000, 20,000 ppm, *ad libitum*	At 20,000 ppm: morphological changes of the bladder luminal surface evident by SEM	[redacted] 6.10 (02)
90-day, dietary + acute DNA-binding study in rats	90-day study: Biphenyl-2-ol, sodium biphenyl-2-olate : 2% in diet Acute assay: Biphenyl-2-ol, sodium biphenyl-2-olate : 500 mg/kg	sodium biphenyl-2-olate , but not Biphenyl-2-ol, caused regenerative hyperplasia of the urinary bladder. Biphenyl-2-ol-treated rats revealed renal damage. No interactions with DNA could be demonstrated for either compound.	[redacted] 6.10 (06)
8-week, dietary, rats	Biphenyl-2-ol: 1.25% with or without $NaHCO_3$ sodium biphenyl-2-olate : 2% with or without NH_4Cl	Males are more sensitive to Biphenyl-2-ol than females under alkalinuric conditions with respect to bladder hyperplasia.	[redacted] 6.10 (07)

Table 2.2.1.1-2: Other/special studies with Biphenyl-2-ol

Type of study	Dosage	Results	Reference
1-week, dietary, rats	Biphenyl-2-ol, sodium biphenyl-2-olate : 0.1-2.0%	Biphenyl-2-ol and sodium biphenyl-2-olate caused a dose-dependent increase in agglutinability of bladder epithelial cells by Con A which is an indication for carcinogenic potential.	[redacted] 6.10 (08)
Acute oral, rat	Biphenyl-2-ol, PHQ, PBQ: 700, 1400 mg/kg bw, single oral gavage, with or without inhibition of GSH synthesis	Biphenyl-2-ol treatment led to GSH depletion and eosinophilic degeneration of centrilobular hepatocytes. Inhibition of GSH synthesis aggravated hepatotoxicity of Biphenyl-2-ol.	[redacted] 6.10 (09)
Cytotoxicity test in primary rat hepato-cytes	Biphenyl-2-ol, PHQ: 0–1 mM	Biphenyl-2-ol cytotoxicity is enhanced by monooxygenase inhibition and GSH depletion. PHQ-induced cell death can be inhibited by sulfhydryl compounds.	[redacted] 6.10 (10)
In-vitro and in-vivo macro-molecular binding assay	^{14}C-Biphenyl-2-ol: 1 µCi In vivo: Biphenyl-2-ol, sodium biphenyl-2-olate : 50-500 mg/kg, oral gavage, 16-18 h	A non-linear increase in macromolecular binding of Biphenyl-2-ol and sodium biphenyl-2-olate was observed in vivo and in vitro. This may be caused by the saturation of detoxification pathways.	[redacted] 6.10 (11)
In-vitro metabolism of Biphenyl-2-ol	Biphenyl-2-ol: 1-100 µM	Biphenyl-2-ol is oxidised to PHQ and PHQ is oxidised to PBQ by cytochrome P-450. PBQ is reduced back to PHQ by cytochrome P-450 reductase (redox cycling).	Roy 6.10 (12)
In-vivo assay of DNA synthesis in bladder	Biphenyl-2-ol, SOPP: 2% in diet; 4–24 weeks	Biphenyl-2-ol and SOPP cause a proliferative response in renal pelvis and papilla when given at a dietary level of 2%.	[redacted] 6.10 (13)
In-vitro and in-vivo GSH conjugation	In-vitro study: 79 µg/mL In-vivo study: 1000 mg/kg, single oral dose	PHQ-GSH is excreted via the bile after Biphenyl-2-ol administration to rats. In vitro, PHQ-GSH can be formed non-enzymatically from PBQ and GSH or enzymatically from Biphenyl-2-ol and GSH.	[redacted] 6.10 (14)
In-vivo assay of	0, 15, 50, 125, 250,	Biphenyl-2-ol or its metabolites form protein, but not DNA,	[redacted] 6.10 (16)

Table 2.2.1.1-2: Other/special studies with Biphenyl-2-ol

Type of study	Dosage	Results	Reference
DNA and protein adducts in rats	500, 1000 mg/kg Biphenyl-2-ol, single oral gavage	adducts in urinary bladder tissue.	
Ten-week feeding study in rats	Biphenyl-2-ol: 1.25% in diet sodium biphenyl-2-olate : 2.0% in diet 10 weeks	Biphenyl-2-ol and sodium biphenyl-2-olate caused urothelial hyperplasia in rats as evident by histology and increased cell proliferation.	[redacted] 6.10 (17)
7 and 14 days feeding study in male B6C3F1 mice	0, 500, and 1000 mg/kg/day Biphenyl-2-ol in the diet for 7 and 14 days	The results indicate that Biphenyl-2-ol may be an agonist ligand for PPARα.	OPP_TOX_chronMaus_PPAR tumors_REPORT_2009-10

2.2.1.2. Effects assessment

The AELs were set as follows:

	Critical Study	Critical NOAEL	Assessment factor	AEL
Short exposure	teratogenicity oral study in New Zealand White rabbits	100 mg/kg bw/day	100	1 mg/kg bw/day
Mid exposure	2-years oral study	39 mg/kg/day for males	100	0.4 mg/kg bw/day
Long exposure	2-years oral study	39 mg/kg/day for males	100	0.4 mg/kg bw/day

Reasons for establishing critical endpoints

The acute AEL for risk characterization was deduced from a teratogenicity oral study in New Zealand White rabbits ([redacted] 6.8.1-02). The relevant NOAEL for maternal toxicity adopted was 100 mg/kg bw/day on the basis of the increased mortality (13%), gross pathologic alterations and histopathologic alterations. Therefore, considering an assessment factor of 100, an AELacute of 1 mg/kg bw/day was calculated.

For mid and long term exposure, an Acceptable Exposure Level (AEL) value for repeated use is deduced from the NO(A)EL for chronic oral exposure in a 2-years oral study ([redacted] 6.5-01a,

6.7-01a). The NOAEL is 39 mg/kg/day on the basis of the increased incidence of simple urinary bladder hyperplasia in males and the increased incidence of urinary bladder transitional cell carcinoma in males. . An AF=100 was established after a follow up discussion (See comment below). Therefore, considering an assessment factor of 100, an AELmedium and AELlong of 0.39 mg/kg bw/day was calculated.

Conclusion of the follow up discussion for establishing AF

In the combined chronic toxicity and carcinogenicity study of [redacted] (1996), the transitional cell carcinoma occurred in rats treated with biphenyl-2-ol at 200 mg/kg bw/d, while the same effect was reported in rats at 270 mg/kg bw/d after life span administration of sodium biphenylate (Fujii 1985). The NOAEL of 39 mg/kg bw/d from [redacted] study, to be used for the derivation of the reference values, would be 5-fold lower than the LOAEL of 200 mg/kg bw/d for transitional cell carcinoma. Overall, the rat seemed to be the most sensitive species, since the administration of biphenyl-2-ol to mice and dogs did not lead to adverse effects in the urinary bladder, and male rats appeared to be more susceptible to bladder tumours than the female rats. The male rat is in general considered much more susceptible to bladder changes including tumours related to local effects than other animal species and humans.

Three ad hoc follow-up participants considered that the mechanisms of bladder tumour formation is not completely known and the relevance of these tumours for humans cannot be excluded, therefore they proposed a margin of safety of 1000 from the LOAEL of 200 mg/kg bw/d, that would result in an additional assessment factor of 2.

However, given the bladder tumours species sensitivity, five participants agreed that an assessment factor of 100 applied to the conservative NOAEL of 39 mg/Kg bw/d would provide an adequate margin of safety for humans.

The eCA supported the majority view and an AF of 100 is applied.

The AELlong-term and AELmedium-term are rounded to 0.4 mg/kg bw/d

End points for Local effect assessment

For local effects, the NOAEC for short exposure is 7.5% on the basis of irritation effect of the assay dosing in the Screen Phase of the guinea pig sensitization study ([redacted] 6.1.5-01/1994b). An additional Assessment Factor (AF) is applied for deriving AEC for short exposure from a LOAEC. A AF of 10 (10 for intraspecies variability) is applied.

No NOAEC/LOAEC/AEC may be deduced for medium or long term exposure.

Conclusion of classification for carcinogenicity
There are evidences suggesting that these tumours in male rats are not relevant to human as the MOA is related with special sensitivity to alkalinisation in male rat bladder. However, the mechanisms of bladder tumour formation is not completely known and the relevance of these tumours for humans cannot be completely excluded. Therefore, biphenyl-2-ol may be classified as carcinogen Cat 2

2.2.1.3. Exposure assessment

The active substance, Biphenyl-2-ol as Preventol O Extra or Preventol ON Extra Preservative Solution can be used as a preservative in many industrial liquid systems. Therefore human exposure has been assessed both for the use of the biocidal product and use of example downstream products by both professional and non-professional users, and including an assessment of indirect exposure as a result of the use of the downstream products.

The exemplary applications for which exposure assessments are presented are as follows:

- PT 6.01: Preservation of liquid detergents. The product is added to the cleaning agent at a final concentration of 5,000 ppm Biphenyl-2-ol maximum.

- PT 6.02: Preservation of paper additive suspensions. The product is added to the filler suspension at a final concentration of 6,000 ppm Biphenyl-2-ol maximum.

The assessment of human exposure was performed according to the TNsG on Human Exposure to Biocidal Products (2002, 2007, taking into account User Guidance to report 2002) and the exposure models contained in the computer programme ConsExpo 4.1.

Human exposure assessment for industrial users

The exposure during the production of the active substance and the formulation of the biocidal product (b.p.) are not assessed by the Rapporteur under the requirements of the BPD. However the Rapporteur assumes that the production/formulation is performed in conformity with national and European occupational safety and health regulations.

Industrial use covers the formulation of b.p. into final end use preserved products. The procedure of preserving the aqueous system to be protected is similar regarding the final end use product (PT 6.01 /PT 6.02). The steps are:

1) preparing a pre-mix from the solid active substance and
2) pumping the pre-mix into the aqueous system to be protected.

The example of paper additive preservation is chosen because it involves a higher concentration of 6,000 ppm, (0.6% w/w) Biphenyl-2-ol.

The in-can preservative Preventol O Extra containing min. 99% w/w Biphenyl-2-ol is incorporated by industrial users into the final end use products in two steps. The first step involves the preparation of a premix of the formulation Preventol O Extra. Biphenyl-2-ol is dissolved in a suitable solvent, e.g., propylene glycol. Alternatively, a 40% solution of benzene alkansulfonate (emulsifier) in an isopropanol/water (1:1) mixture is a good vehicle for Biphenyl-2-ol.

The second step involves the addition of the premix (containing 25% Biphenyl-2-ol) to the aqueous system to be protected. The biocide is incorporated by simple dilution into end use product.

The end-use product will then be used by professional users in paper manufacture or cleaning activities.

The exposure of workers preparing the pre-mix from solid Biphenyl-2-ol during 15 minutes per week is modelled using the TNsG Model 7 "Weigh/Dump Solids" (revised version). To assess the exposure of workers pumping the pre-mix (25% Biphenyl-2-ol) into the paper additive slurry during 60 minutes per day, the TNsG Model 7 "Pumping Liquids" (revised version) is adopted.

Preventol ON Extra Preservative Solution is added to the mixing vessel by means of dedicated lines and automatic remote control systems (no direct human involvement). Taking into account that operators are exposed to Biphenyl-2-ol anion in alkaline media which is not volatile exposure via the inhalation route is negligible. In addition dermal exposure is prevented by the use of adequate PPE and considering that the product is classified as corrosive it is not necessary to assess the risk from dermal exposure (TGD part I Exposure Assessment pp. 63).

Exposure during bottling of final preserved product containing 0.5% Biphenyl-2-ol (detergents and cleaning agents) is addressed using TNsG Mix and Load model 7 (pump data); 7 hours/day is considered, on a daily basis.

Human exposure assessment for professional users

The application of biocidal products containing Biphenyl-2-ol as in can preservative in a professional environment can result in direct exposure via skin contact or via inhalation, but the oral ingestion is not considered as a potential direct route for exposure. Professional exposure is assumed to be chronic.

The worst case exposure scenario for the purpose of the professional exposure assessment to preserved detergents and cleaning agents is the use of glass cleaners. The product is first applied undiluted by means of a trigger spray and it is followed by the wiping of the sprayed surface. The models Consumer product spraying and dusting model 2 (hand held trigger spray) and Surface disinfection models 1 & 3, from TNsG are used to assess exposure of professionals.

Exposure of professionals to 'virtual' cleaning agent containing 0.25% Biphenyl-2-ol is considered. At biocidal product authorization level exposure and risk assessment has to be updated considering the final in use concentration at which the authorization is sought for.

The exposure of workers pumping the preserved slurry during manufacture of paper is addressed using the Mix and Load Model 7 "Pumping Liquids" during 60 minutes per day as a worst case estimation. The scenario uses the maximum final concentration of Biphenyl-2-ol in the additive slurry, 0.6% w/w.

Human exposure assessment for non professional users

Non professional exposure associated with use of preserved detergents is addressed using models contained in the computer programme ConsExpo 4.1: hand laundry, hand dishwashing and surface cleaning using liquid spray.

Default values used to address exposure are described in RIVM report 320104003/2006, Cleaning Products Fact Sheet. The exposure associated to the use of preserved liquid detergents and cleaning agents is chronic.

Non professional exposure to preserved mineral slurries in paper manufacture is not envisaged.

Human exposure assessment from indirect exposure as a result of use

Indirect exposure of consumers to materials or articles containing residues of biocide is considered: dermal exposure to textiles washed with detergents and oral ingestion of dried residues of cleaning agents in dishes and dermal contact of children when crawling on wet surfaces. Indirect exposure to detergent and cleaning agents is addressed using models provided in the computer programme ConsExpo 4.1., and it is considered a chronic exposure.

Indirect exposure to preserved mineral slurries used in paper manufacture is not addressed.

2.2.1.4. Risk characterisation

Summary of risk assessment for industrial use

Preventol O Extra is classified as is irritant to the eyes, respiratory system and skin. Handling of solid Preventol O Extra requires the use of PPE in Tier 1 assessment. Considering the type of local irritant effects of Biphenyl-2-ol (Preventol O Extra), suitable RMMs including process optimisation, security procedure and appropriate and suitable PPE is essential to protect professionals from local effects of Biphenyl-2-ol. In addition, RPE would be required if aerosols or dust is produced during this task. Due to the potential local exposure via the inhalation route, appropriate technical measures (i.e., LEV) should be in place to reduce airborne levels/particulate matter. RPE should be used if this reduction by technical procedures is not possible.

Appropriate PPE to handle corrosive chemicals must be worn during the use of Preventol ON Extra Preservative Solution.

In the assessment showed below, the inhalation exposure is reduced by a factor of 10 (provided by technical measures or RPE).

Medium term Exposure Scenario	Exposure Adults (mg/kg bw/[d])	AEL (mg/kg bw/[d])	Exposure % AEL
Manufacture of end use preserved product; (1) preparation of premixed concentrate from solid Biphenyl-2-ol, weight, 15 min weekly, Tier 2			
Inhalation*	3.73E-03	0.4	1
Dermal**	0.32623563	0.4	81.5
Total	0.329966	0.4	82.5
* RPE, PF = 10 (or technical measures (LEV) reducing airborne levels 10-fold); RPE required if aerosol or dust is produced ** gloves, coverall required to handle solid Biphenyl-2-ol			
Chronic Exposure Scenario	Exposure Adults (mg/kg bw/[d])	AEL (mg/kg bw/[d])	Exposure % AEL
Manufacture of end use preserved product; (2) addition of premixed concentrate, pumping, 25% Biphenyl-2-ol, 10 min, daily, Tier 1			
Inhalation	0.019094	0.4	5
Dermal	2.4725	0.4	618
Total	2.491594	0.4	623
Chronic Exposure Scenario	Exposure Adults (mg/kg bw/[d])	AEL (mg/kg bw/[d])	Exposure % AEL
Manufacture of end use preserved product; (2) addition of premixed concentrate, pumping, 25% Biphenyl-2-ol, 10 min, daily, Tier 2			
Inhalation	1.91E-02	0.4	2.4
Dermal*	0.024725	0.4	3.6
Total	0.04381	0.4	6
* gloves, coverall			
Chronic Exposure Scenario	Exposure Adults (mg/kg bw/[d])	AEL (mg/kg bw/[d])	Exposure % AEL
Bottling of end use preserved product, pumping, 0.5% Biphenyl-2-ol, daily, Tier 1			
Inhalation	1.60E-02	0.4	4

Dermal	2.076900	0.4	519
Total	2.092939	0.4	523
Chronic Exposure Scenario	Exposure Adults (mg/kg bw/[d])	AEL (mg/kg bw/[d])	Exposure % AEL
Bottling of end use preserved product, pumping, 0.5%Biphenyl-2-ol, daily, Tier 2			
Inhalation	1.60E-02	0.4	4
Dermal*	0.020769	0.4	5
Total	0.036808	0.4	9
* gloves, coverall			

Exposure levels for Tier 2 assessment are within acceptable margins. Therefore, the exposure for industrial users is considered to be within the acceptable range provided that adequate PPE is worn.

Summary of risk assessment for professional use

Exposure to 'virtual' cleaning agent containing 0.25% Biphenyl-2-ol is considered below. It must be noted that exposure and risk assessment has to be updated at biocidal product authorization level considering the final in use concentration at which the authorization is sought for.

Cleaning agents: exposure levels for Tier 2 assessment is within acceptable margins. Therefore, the exposure for professional users is considered to be within the acceptable range provided that adequate PPE is worn (coverall and gloves).

Chronic Exposure Scenario	Exposure Adults (mg/kg bw/[d])	AEL (mg/kg bw/[d])	Exposure % AEL
Cleaning surfaces using preserved detergent (no dilution), (0.25% OPP[1]), hand held trigger spray 50 min, wiping 220 min, daily, Tier 1			
Inhalation	4.8E-03	0.4	1.2
Dermal	0.663024	0.4	166
Total	0.667852	0.4	167
[1]update concentration at b.p. authorisation level			
Chronic Exposure Scenario	Exposure Adults (mg/kg bw/[d])	AEL (mg/kg bw/[d])	Exposure % AEL
Cleaning surfaces using preserved detergent(no dilution), (0.25% OPP[1]), hand held trigger spray 50 min, wiping 220 min, daily, Tier 2			

Inhalation	4.8E-03	0.4	1.2
Dermal*	0.124815	0.4	31
Total	0.129643	0.4	32
[1]update concentration at b.p. authorisation level * gloves, coverall (80% protection)			
Chronic Exposure Scenario	Exposure Adults (mg/kg bw/[d])	AEL (mg/kg bw/[d])	Exposure % AEL
Use of preserved mineral slurry in paper manufacture, pumping 0.6% Biphenyl-2-ol, 1 hour/day, Tier 1			
Inhalation	2.75E-03	0.4	0.7
Dermal	0.35604	0.4	89
Total	0.35879	0.4	90
Chronic Exposure Scenario	Exposure Adults (mg/kg bw/[d])	AEL (mg/kg bw/[d])	Exposure % AEL
Use of preserved mineral slurry in paper manufacture, pumping 0.6% Biphenyl-2-ol, 1 hour/day, Tier 2			
Inhalation	2.75E-03	0.4	0.7
Dermal*	0.00356	0.4	0.8
Total	0.006131	0.4	1.5
* gloves, coverall (10% penetration)			

Exposure levels for both Tier 1 and Tier 2 are within acceptable margins during paper manufacture.

Summary of risk assessment for non-professional use

Secondary exposure of consumers is estimated assuming 0.5% Biphenyl-2-ol final end-use concentration in preserved product. The exposure and risk assessment have to be updated at biocidal product authorization where detailed data on the actual use are available.

The exposure for non professional users is considered to be within the acceptable range.

Chronic Exposure Scenario	Exposure Adults (mg/kg bw/[d])	AEL (mg/kg bw/[d])	Exposure % AEL
Non professional hand washing of clothes, 0.5% OPP[1]			
Inhalation	1.84E-05	0.4	-

Dermal	7.17E-03	0.4	1.8
Total	7.19E-03	0.4	1.8
[1]update concentration at b.p. authorisation level Dilution factor at the application step according to ConsExpo			
Chronic Exposure Scenario	Exposure Adults (mg/kg bw/[d])	AEL (mg/kg bw/[d])	Exposure % AEL
Non professional hand washing of dishes, 0.5% OPP[1]			
Inhalation	7.77E-06	0.4	-
Dermal	7.88E-04	0.4	0.20
Total	8.57E-04	0.4	0.20
[1]update concentration at b.p. authorisation level Dilution factor at the application step according to ConsExpo			
Chronic Exposure Scenario	Exposure Adults (mg/kg bw/[d])	AEL (mg/kg bw/[d])	Exposure % AEL
Non professional spray and cleaning of surfaces, 0.5% OPP[1]			
Oral	6.24E-05	0.4	0.02
Inhalation	2.66E-04	0.4	0.07
Dermal	6.41E-03	0.4	1.60
Total	6.74E-03	0.4	1.7
[1]update concentration at b.p. authorisation level Dilution factor at the application step according to ConsExpo			

Summary of risk assessment from indirect exposure as a result of use of cleaning agents

These indirect exposure estimations assume 0.5% Biphenyl-2-ol final end-use concentration in preserved product. The exposure and risk assessment have to be updated at biocidal product authorization where detailed data on the actual use are available. The indirect exposure due to the use of preserved detergents is below the level of concern

Chronic Exposure Combined Scenarios	Exposure Adults (mg/kg bw/[d])	AEL (mg/kg bw/[d])	Exposure % AEL
Ingestion of residues on plates[1] & Dermal contact with residues on clothing[1]			
Oral	4.9E-08	0.4	-
Dermal	0.0659	0.4	16.5

Total	0.0659	0.4	16.5
[1] estimated according to ConsExpo (preserved detergents at 0.5% Biphenyl-2-ol, update concentration at b.p. authorisation level)			
Indirect Exposure Scenarios	Exposure Children *Chronic (mg/kg bw/[d]) **Acute (mg/kg bw)	AEL *Chronic (mg/kg bw/[d]) **Acute (mg/kg bw)	Exposure % AEL
Ingestion of residues on plates (Chronic)[1] Dermal contact when crawling on wet surfaces (Acute) [1]			
Oral	*1.96E-07	*0.4	-
Dermal	**0.182	**1	18
[1] estimated according to ConsExpo (preserved detergents at 0.5% Biphenyl-2-ol, update concentration at b.p. authorisation level)			
Chronic Exposure Combined Scenarios	Exposure Infants (mg/kg bw/[d])	AEL (mg/kg bw/[d])	Exposure % AEL
Ingestion of residues on plates[1]			
Oral	2.94E-07	0.4	-
Total	2.94E-07	0.4	-
[1] estimated according to ConsExpo (preserved detergents at 0.5% Biphenyl-2-ol, update concentration at b.p. authorisation level)			

Other indirect exposure scenarios

At product authorization depending on the use patterns of the products in PT 6 when actual data on uses are available, the procedure described in the DRAWG Opinion on identifying worst-case uses for PT 6 biocidal products in order to minimise the number of uses to be assessed for dietary risk, endorsed at TMII2013 must be followed.

Other secondary exposure scenario that may be considered via ingestion is 'mouthing of treated paper and paint chips' (TNsG 2007, table 3, pp.22) which may be relevant for children/infants. This scenario however is not assessed here as there is no information on the amount of a.s. used for paper manufacture.

In addition, PT6 uses of biocidal products fall under the scope of Guidance documents on Estimating Dietary Risk from Transfer of Biocidal Active Substances into Foods – Non-professional and Professional Uses. At biocidal product authorisation this guidance must be followed to assess whether a dietary risk characterisation and an MRL assessment must be performed.

2.2.2. Environmental Risk Assessment

2.2.2.1. Fate and distribution in the environment

Considering the hydrolytic stability determined under stringent temperature conditions and at different pH values, it is not expected that hydrolytic processes will contribute to the degradation of Biphenyl-2-ol in the aquatic systems (estimated DT_{50} > 1 year).

Biphenyl-2-ol is rapidly photodegraded in sterile aqueous 0.01 M phosphate buffer (experimental DT_{50} = 0.3 days). Diketohydroxy-compound (maximum 13.6% AR) and benzoic acid (maximum 7.9% AR) were identified as the major transformation products, other 3 unidentified compounds were found to have a maximum between 1% and 10% of the AR. Innumerable minor phototransformation products (each < 1% AR) were formed. All transformation products occurred transiently and decreased to amounts of < 5% AR at the end of the study. In all cases the QSAR estimates were indicative of a significant potential for rapid degradation in the environment.

The tropospheric half-life of Biphenyl-2-ol was estimated using the AOPWIN program (v. 1.91, 2000). Using a mean daily OH concentration in air of 0.5 x 10^6 OH radicals per cm^3, a half-life in air of 0.59 days was assessed - corresponding to a chemical life-time in air of about 0.85 days - due to indirect photodegradation. It is not to be expected that it can be carried in the gaseous phase over long distances or can accumulate in air. Furthermore, Biphenyl-2-ol has a low vapour pressure.

Biphenyl-2-ol is concluded to be readily biodegradable (71-76% after 28 days and 100% after 16 days, respectively). Moreover, high overall removal rates in activated sludge wastewater treatment plants of 99 to 100% (complete mineralization) were observed in a monitoring study conducted by Körner *et al*. (2000) in a municipal sewage plant Steinhäule located on the Danube River in southern Germany. This study confirmed the results found in the Ready Biodegradability test and were considered as a Tier 2 approach in the risk assessment

The simple first order DT_{50} value of Biphenyl-2-ol in the test soil was 1 day (DT_{50} 2.7 hours) providing an appropriate margin of safety. A DT_{50} default value in soil of 30 days (according to the TGD for Risk Assessment Chapter 3, Table 8) is considered to be as worst case for the risk assessment and a DT_{50} of 1 day as a refinement.

Based on two reliable adsorption/desorption studies and the results obtained in the soil degradation study, no potential for translocation into deeper soil layers or even ground water is given. K_{oc} values were 346.7 in the HPLC screening test and 252-392 in the adsorption/desorption (batch equilibrium) study. Based on a classifications K_{oc} value of 347 $L \cdot kg^{-1}$, Biphenyl-2-ol can be classified as a moderately mobile substance.

Although a log P_{ow} of 3.18 was determined, no indication for a possible bioaccumulative potential of Biphenyl-2-ol is given due to a calculated steady-state bioconcentration factor (BCF) of 21.7 (wet weight), 114-115 (lipid content). Taking into consideration these low bioconcentration factors and the low computed concentrations in surface water, a significant food chain concern does not exist.

2.2.2.2. Effects assessment

STP compartment

According to TGD for Risk Assessment (EC, 2003), and taking into account the test available with aquatic micro-organisms (according to OECD 209 with activated sludge, EC_{50} = 56 mg Biphenyl-2-ol·L^{-1}), an assessment factor of 100 can be applied. Thus, a $PNEC_{microorganisms}$ of 0.56 mg a.i./L is derived.

Surface water compartment

The toxicity of Biphenyl-2-ol to aquatic organisms is well documented by acute and long-term studies. Three chronic NOEC values for the three trophic levels of the base set (fish, *Daphnia*, algae) are available for the aquatic compartment resulting in NOECs of 0.036 mg a.i./L (*Pimephales promelas*), 0.006 mg a.i./L (*Daphnia magna*) and 0.468 mg a.i./L (*Pseudokirchneriella subcapitata*). A sediment-water chironomid toxicity test using spiked water is available with *Chironomus riparius* with a NOEC of 1.85 mg a.i./L. Since concentrations declined during the test (34-55% present in the water phase after 7 days), initial concentrations in water are not adequate to express the NOEC.

The lowest NOEC value (*Daphnia magna*) of 0.006 mg a.s./L is considered for the PNEC calculation. Since long-term NOECs are available for all three trophic levels, an assessment factor of 10 was applied to the lowest long-term NOEC value. The $PNEC_{water}$ was thus calculated to be 0.0006 mg a.i./L.

Sediment

In two preliminary range finding test (non-GLP) with spiked sediment and spiked water, it was found that the test organisms exposed to spiked water were affected at considerably lower concentrations than the larvae exposed to spiked sediment, with a NOEC of 1.85 mg/L expressed as a concentration in water.

However, it is not agreed to use the NOEC for *C. riparius* because this NOEC is expressed on the basis of initial concentrations in the water phase and, actual concentrations during the 28-days were much lower because of distribution to sediment. For this reason, the equilibrium partitioning on the $PNEC_{water}$ has been used. For this, the Foc in suspended matter (0.1) should be used instead of the Foc sediment resulting in a $PNEC_{sediment}$ of 0.0049 mg/kg_{wwt} (0.02254 mg/kg_{dwt}).

$PNEC_{sed}$	$= (K_{susp\text{-}water}/RHO_{susp}) * PNEC_{water} * 1000$	(page 113 of TGD)
$K_{susp\text{-}water}$	$= Fwater_{susp} + (Fsolid_{susp} * (Kp_{susp}/1000) * RHO_{solid})$	(page 47 of TGD)
	$= 0.9 + (0.1 * (34.7/1000) * 2500) = 9.575\ m^3/m^3$	
$PNEC_{sed}$	$= (9.575/1150) * 0.0006 * 1000 = 0.0049$ mg/kg	
$PNEC_{sed}$	= 0.0049 mg/kg Biphenyl-2-ol/kg wet sediment	

Terrestrial compartment

For the effects assessment of the soil, compartment tests are available for three trophic levels (terrestrial microorganisms, earthworms, and plants):

- Terrestrial microorganisms (C- and N-cycle):

  EC_{50} (28 days) = 633.5 mg a.s.$\cdot kg_{dw}^{-1}$ soil

- Earthworms (*Eisenia fetida*):

  LC_{50} (14 days) = 198.2 mg a.i.$\cdot kg^{-1}$ soil

  NOEC (14 days) = 125 mg a.i.$\cdot kg_{dw}^{-1}$ soil

- Terrestrial plants (*Avena sativa*):

  LC_{50} (14 days) = 53.9 mg a.i.$\cdot kg^{-1}$ soil

  NOEC (14 days) = 12.5 mg a.i.$\cdot kg_{dw}^{-1}$ soil

The lowest result was obtained in the study with plants. A $PNEC_{soil}$ was calculated on basis of the lowest LC_{50} of three trophic levels using an assessment factor of 1000 (TGD, Table 20).

$PNEC_{soil}$ = 53.9 mg Biphenyl-2-ol·kg^{-1} dry weight soil·10^{-3}
= 0.054 mg Biphenyl-2-ol·kg^{-1} dry weight soil
= 0.054 * 1.13
$PNEC_{soil}$ = 0.061 mg Biphenyl-2-ol·kg^{-1} wet weight soil

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

A flow-through study was conducted to evaluate the bioconcentration of Biphenyl-2-ol in zebra fish (*Danio rerio*). The arithmetic means of five consecutive steady-state BCF were 21.7 (wet weight), 114-115 (lipid content), indicating a negligible potential of the test substance to bioaccumulate. The achievement of steady-state conditions during the uptake (53 h exposure) phase as well as the consecutive depuration (19 h) were rapid processes.

A risk due to the proposed uses of Biphenyl-2-ol can be ruled out, since these data show that Biphenyl-2-ol does not accumulate in the environment. There is no need to assess this exposure route further.

The summary of ecotoxicity data used for the risk assessment are summarised in the Table 2.2.2.2-1.

Table 2.2.2.2-1: Summary of toxicity data used for the risk assessment

Species	Endpoint /Type of test	Results [mg a.i./L]
Oncorhynchus mykiss	Fish acute 96 h - LC_{50} Mortality	4
Daphnia magna	Aquatic invertebrates acute 48 h - LC_{50} Mortality	2.7
Pseudo-kirchneriella subcapitata	Algae growth inhibition 72 h – NOEC Growth inhibition	0.468
Activated sludge	Microorganisms 3 h - respiration inhibition	56
Pimephales promelas (Fathead minnow)	Fish chronic 21 d - NOEC Reproduction (Egg hatch F1) 21 d - LOEC Reproduction (Egg hatch F1)	36 293
Daphnia magna	Aquatic invertebrates chronic 21 d – NOEC Reproduction	0.006
Avena sativa	14 d – EC_{50} Germination rate, mortality and phytotoxicity	53.9
Eisenia fetida	Earthworms 14 d –LC_{50} Mortality, weight, abnormal behaviour	198.2
Soil microorganisms	28 d – EC_{50} nitrification	633.5
Mallard duck	Birds 14 d – LC_{50}	>2250
Mallard duck	Birds 5 d – LD_{50}	>5620
Rat Fischer 344	Mammals acute LD_{50} 1 dose + 2 weeks of observation	2733 mg/kg
Beagle Dogs	Mammals chronic NOAEL 1 year	300 mg/kg/day

2.2.2.3. PBT and POP assessment

Assessment of PBT criteria

Biphenyl-2-ol can be considered readily biodegradable. Monitoring and laboratory studies have also shown that Biphenyl-2-ol is easily removed in STP systems. Based on literature studies, Biphenyl-2-ol is also not persistent water-sediment systems, and a soil biodegradation study also has shown that Biphenyl-2-ol is removed either by sorption or by biodegradation process. Considering the hydrolytic stability determined under stringent temperature conditions and at different pH values it is not expected that hydrolytic processes will contribute to the degradation of Biphenyl-2-ol in the aquatic systems (estimated DT_{50} > 1 year), however, from the photolysis study in water, it has been shown that Biphenyl-2-ol is photolytically unstable in the aqueous medium. Therefore, it is unlikely that Biphenyl-2-ol persists in the water, sediment or soil compartments.

The assessment of the (potential for) bioaccumulation in the context of PBT or vPvB evaluation makes use of measured bioconcentration factor. When not available, BCF value may be estimated from the octanol/water partition coefficient (Kow) by using (Q)SAR models. The calculated steady-state bioconcentration factor (BCF) for fish of 21.7 L/kg (wet weight), 114-115 (lipid content), indicates a negligible potential of Biphenyl-2-ol to bioaccumulate. Therefore, Biphenyl-2-ol does not fulfil the B criterion since its BCF is under the cut-off values proposed in the TGD (BCF > 2,000 for PBT assessment and > 5,000 for vPvB assessment).

The lowest NOEC obtained for Biphenyl-2-ol was 0.006 mg/L (*Daphnia magna* test). Since the cut off value given by the TGD corresponds to 0.01 mg/L, the substance meets the T criterion.

Assessment of POPs criteria

The vapour pressure of Biphenyl-2-ol is 0.906 Pa at 25°C, the half-life in air is of 0.587 days, indicating that the criteria for long-range transport potential (vapour pressure < 1000 Pa and half-life in air > 2 days) is not fulfilled. In soil, biodegradation and sorption study was performed to understand the persistence of Biphenyl-2-ol in this compartment, indicating that Biphenyl-2-ol is relatively low mobile in soil, although a biodegradation character can also be attributed.

The calculated steady-state bioconcentration factor (BCF) for fish is 21.7 L/kg (wet weight), 114-115 (lipid content), and hence < 5000. Thus, the bioaccumulation criterion is not fulfilled for Biphenyl-2-ol.

In conclusion, considering the above rationale, it can be concluded that Biphenyl-2-ol does not fulfil the POPs criteria.

Conclusion:

Biphenyl-2-ol must not be regarded as a Persistent or Bioaccumulative, Toxic, POP or ED substance because it does not fulfil the criteria. Therefore, Biphenyl-2-ol is not PBT/vPvB.

2.2.2.4. Exposure assessment

The biocidal product Preventol O Extra presented is the active substance (≥ 99.5%) but it is not actually the final formulation that will be used. Therefore, data of real biocidal product will need to be demanded at national product authorisation.

The biocidal PT 6 product Preventol ON Extra Preservative Solution contains ca. 17.7% Biphenyl-2-ol in alkaline solution. Here due to the pH of > 12, Biphenyl-2-ol and its alkali salt

are present in equilibrium. Environmental exposure may occur by unintended splashes of the biocidal product itself, cleaning operations, or by releases of a preserved matrix (pH < 9) to the environmental compartments. Due to the buffer capacity of the aquatic compartment and the high dilution effect of any alkali release (starting with the waste water channel and the STP) even the local environmental pH will not be affected significantly and will constantly stay below 9, so that a conversion of any released alkali salt form to the genuine phenolic form instantly takes place (the equilibrium is quantitatively expressed in the Henderson Hasselbach equation). Thus for the environment only the exposure to the free phenolic compound Biphenyl-2-ol must be assessed.

In the present assessment for Preventol O Extra and Preventol ON Extra Preservative Solution, sewage water treatment plants are regarded as the only pathway of direct Biphenyl-2-ol emissions after use as in-can/in-tank preservative for industrial waterborne systems (see Doc. II-B).

Preventol O Extra

Two scenarios were considered as PT 6 In-can preservatives:

PT 6.01 (PT 6.1.2 according to MOTA -TM IV 08-) → Washing and cleaning fluids (general) and other detergents (Dishwashing liquids): two products types were assessed (Hand washing, Machine wash). The following Biphenyl-2-ol concentrations were reported: for the machine wash scenario the Biphenyl-2-ol concentration amounts of 5000 mg/L and for the hand wash scenario a concentration of 2000 mg/L. The emission rates to STP are summarized in the following table:

Table 2.2.2.4-1: Local emission to wastewater during episode from the use as dishwashing liquid

Local Emission of active ingredient per day to STP	**[kg/day]**
Professional use	
Laundry from hospitals	0.72
Cleaning of industrial and public areas	0.5
Cleaning of health care areas	0.1875
Total professional use	1.4075
Non-professional use	
Laundry	0.885
Cleaning of tiles, floor, sinks, lavatory, etc.	0.175
Total non-professional use	1.03
Total from professional and domestic uses	
	2.4375

PT 6.02 (PT 6.3.1 according to MOTA –TM IV 08-) → Fluids used in paper production (Preservation paper additives): A concentration of 5,000 ppm as a maximum concentration was reported. The emission rates to STP are summarized in the following table:

Table 2.2.2.4-2: Local emission to wastewater during episode from the use in fluids for paper production

Local Emission of active ingredient per day to STP [kg/day]	
Printing and writing	
(Fpenetr=1)	8.58
(Fpenetr=0.5)	**4.29**
Tissue	
(Fpenetr=1)	7.89
(Fpenetr=0.5)	**3.95**
News print	
(Fpenetr=1)	9.88
(Fpenetr=0.5)	**4.94**
Total Local Emission of active ingredient per day to STP [kg/day]	
(Fpenetr=1)	2.64E+01
(Fpenetr=0.5)	**1.32E+01**

Preventol ON Extra Preservative Solution

One scenario was considered which is PT 6 In-can preservatives:

PT 6.02 (PT 6.3.1 according to MOTA –TM IV 08-) → Fluids used in paper production (Preservation paper additives): A quantity of product with preservative per tonne of paper produced of 100 L/tonne and a value of 150 ppm of an Biphenyl-2-ol concentration in the paper production were reported. The emission rates to STP are summarized in the following table:

Table 2.2.2.4-3: Local emission to wastewater during episode from the use as preservative for additives

Local Emission of active ingredient per day to STP [kg/day]	
Printing and writing	
(Fpenetr=1)	3.86E-01
(Fpenetr=0.5)	**1.93E-01**
Tissue	
(Fpenetr=1)	3.55E-01
(Fpenetr=0.5)	**1.78E-01**
News print	
(Fpenetr=1)	4.44E-01
(Fpenetr=0.5)	**2.22E-01**
Total Local Emission of active ingredient per day to STP [kg/day]	
(Fpenetr=1)	1.19
(Fpenetr=0.5)	**5.93E-01**

2.2.2.5. Risk characterisation

Aquatic compartment (incl. sewage treatment plant)

The following risk quotients were derived for the aquatic compartment from the calculated/measured exposure and effect data for Biphenyl-2-ol (see Tables 2.2.2.5-1, 2.2.2.5-2, and 2.2.2.5-3).

Preventol O Extra

The following Biphenyl-2-ol PEC values for the machine wash scenario have been calculated with a maximum concentration of 5000 mg Biphenyl-2-ol/L.

Table 2.2.2.5-1: PEC/PNEC ratios for Biphenyl-2-ol (aquatic compartment) in Preventol O Extra used as dishwashing liquid

		STP		fresh water		Sediment	
		PEC (mg/L)	PEC/PNEC	PEC (mg/L)	PEC/PNEC	PEC (mg/kg$_{wwt}$)	PEC/PNEC
Professional use							
Laundry from hospitals	Tier 1[1]	4.43E-02	0.079	4.43E-03	**7.38**	3.69E-02	**7.52**
	Tier 2[2]	4.43E-02	0.079	3.60E-04	0.6	3.00E-03	0.611
Cleaning of industrial and public areas	Tier 1[1]	3.08E-02	0.055	3.07E-03	**5.12**	2.56E-02	**5.22**
	Tier 2[2]	3.08E-02	0.055	2.50E-04	0.416	2.08E-03	0.425
Cleaning of health care areas	Tier 1[1]	1.15E-02	0.021	1.15E-03	**1.92**	9.60E-03	**1.96**
	Tier 2[2]	1.15E-02	0.021	9.37E-05	0.156	7.80E-04	0.159
Total professional use	Tier 1[1]	8.66E-02	0.155	8.65E-03	**14.4**	7.21E-02	**14.7**
	Tier 2[2]	8.66E-02	0.155	7.03E-04	**1.17**	5.86E-03	**1.2**
Non-professional use							
Laundry	Tier 1[1]	5.26E-02	0.094	5.26E-03	**8.76**	4.38E-02	**8.93**
	Tier 2[2]	5.26E-02	0.094	4.27E-04	0.712	3.56E-03	0.726
Cleaning of tiles, floor, sinks, lavatory, etc.	Tier 1[1]	1.08E-02	0.019	1.08E-03	**1.79**	8.96E-03	**1.83**
	Tier 2[2]	1.08E-02	0.019	8.75E-05	0.146	7.28E-04	0.149
Total non-professional use	Tier 1[1]	6.34E-02	0.113	6.33E-03	**10.6**	5.27E-02	**10.8**
	Tier 2[2]	6.34E-02	0.113	5.15E-04	0.858	4.29E-03	0.875
Total from professional and domestic uses							
TOTAL	Tier 1[1]	1.50E-01	0.268	1.50E-02	**25**	1.25E-01	**25.5**
	Tier 2[2]	1.50E-01	0.268	1.22E-03	**2.03**	1.01E-02	**2.07**

[1] Tier 1: 3.13% of the STP influent residues being present in STP sludge
[2] Tier 2: 1% of the STP influent residues being present in STP sludge

Table 2.2.2.5-2: PEC/PNEC ratios for Biphenyl-2-ol (aquatic compartment) in Preventol O Extra used in fluids for paper production

	STP		fresh water		Sediment	
	PEC[1] (mg/L)	PEC/PNEC	PEC[1] (mg/L)	PEC/PNEC	PEC[1] (mg/kg_{wwt})	PEC/PNEC
Printing and writing						
Tier 1[2]	1.06E-01	1.89E-01	1.06E-02	**17.67**	8.79E-02	**17.94**
Tier 2[3]	8.58E-03	1.53E-02	8.58E-04	**1.43**	7.14E-03	**1.46**
Tissue						
Tier 1[2]	9.72E-02	1.74E-01	9.71E-03	**16.18**	8.09E-02	**16.51**
Tier 2[3]	7.90E-03	1.41E-02	7.90E-04	**1.32**	6.57E-03	**1.34**
News print						
Tier 1[2]	1.22E-01	2.14E-01	1.21E-02	**20.17**	1.01E-01	**20.61**
Tier 2[3]	9.88E-03	1.76E-02	9.87E-04	**1.65**	8.22E-03	**1.68**
Total						
Tier 1[2]	3.25E-01	5.8E-01	3.24E-02	**54.09**	2.70E-01	**55.15**
Tier 2[3]	2.64E-02	4.71E-02	2.64E-03	**4.40**	2.19E-02	**4.47**

[1] Fraction of additives with a.i. (market share) = 0.5 (see point 2.2.2.4)
[2] Tier 1: 3.13% of the STP influent residues being present in STP sludge
[3] Tier 2: 1% of the STP influent residues being present in STP sludge

Preventol ON Extra Preservative Solution

Table 2.2.2.5.1-3: PEC/PNEC ratios for Biphenyl-2-ol (aquatic compartment) in Preventol ON Extra Preservative Solution used as preservative for additives

	STP		fresh water		sediment	
	PEC[1] (mg/L)	PEC/PNEC	PEC[1] (mg/L)	PEC/PNEC	PEC[1] (mg/kg_{wwt})	PEC/PNEC
Printing and writing						
Tier 1[2]	4.75E-03	8.48E-03	4.75E-04	7.91E-01	3.95E-03	8.06E-01
Tier 2[3]	3.86E-04	6.89E-04	3.86E-05	6.43E-02	3.21E-04	6.56E-02
Tissue						
Tier 1[2]	4.38E-03	7.82E-03	4.38E-04	7.29E-01	3.65E-03	7.44E-01
Tier 2[3]	3.56E-04	6.36E-04	3.56E-05	5.93E-02	2.97E-04	6.05E-02
News print						
Tier 1[2]	5.46E-03	9.75E-03	5.46E-04	9.10E-01	4.55E-03	9.27E-01
Tier 2[3]	4.43E-04	7.93E-04	4.43E-05	7.40E-02	3.70E-04	7.54E-02
Total						
Tier 1[2]	1.46E-02	2.61E-02	1.46E-03	**2.43**	1.22E-02	**2.49**
Tier 2[3]	1.18E-03	2.11E-03	1.18E-04	1.97E-01	9.91E-04	2.02E-01

[1] Fraction of additives with a.i. (market share) = 0.5; (see point 2.2.2.4)
[2] Tier 1: 3.13% of the STP influent residues being present in STP sludge
[3] Tier 2: 1% of the STP influent residues being present in STP sludge

Sewage treatment plant: The derived risk quotients are clearly < 1, even using the worst-case assumption (Tier 1) of 12.3% of the influent residues being present in the STP effluent water phase for the calculation. Thus, it is considered that there is no unacceptable risk for microorganisms in a STP caused by Biphenyl-2-ol used as used as dishwashing liquid and in fluids for paper production or as In-can preservative for additives.

Surface water: The PEC/PNEC ratios in Preventol O Extra used as dishwashing liquid are > 1 when the total of the professional uses or the total of the professional and domestic uses are taken into account. But the PEC/PNEC ratios are < 1 for the professional or domestic uses, and for the total of the domestic uses with a 1% of the influent residues being present in the STP effluent water phase (Tier 2).

The PEC/PNEC ratios are > 1 in Preventol O Extra used in fluids for paper production.

The PEC/PNEC ratio for the total of uses in Preventol ON Extra Preservative Solution is > 1 using the worst-case assumption (Tier 1); however, using the Tier 2 scenario the PEC/PNEC ratios were all below 1. Therefore, there is no unacceptable risk to aquatic organisms in surface waters exposed to Biphenyl-2-ol used as In-can preservative for additives.

Sediment: The PEC/PNEC ratios in Preventol O Extra used as dishwashing liquid are > 1 when the total of the professional uses or the total of professional and domestic uses are taken into account. But the PEC/PNEC ratios are < 1 for the professional or the domestic uses, and for

the total of the domestic uses.

The PEC/PNEC ratios are > 1 in Preventol O Extra used in fluids for paper production.

The PEC/PNEC ratio for the total of uses in Preventol ON Extra Preservative Solution is > 1 using the worst-case assumption (Tier 1), however, using the Tier 2 scenario the PEC/PNEC ratios are < 1, therefore no relevant risk for sediment is indicated due to the use of Biphenyl-2-ol as In-can preservative.

Terrestrial compartment (soil)

To assess the risk for the environmental compartment soil regarding the exposure via sludge, the $PNEC_{soil}$ is compared with the PEC_{soil} (see Tables 2.2.2.5-4, 2.2.2.5-5, and 2.2.2.5-6).

Preventol O Extra

The following Biphenyl-2-ol PEC values for the machine wash scenario have been calculated with a maximum concentration of 5000 mg Biphenyl-2-ol/L.

Table 2.2.2.5-4: PEC/PNEC ratios for Biphenyl-2-ol (soil compartment) in Preventol O Extra used as dishwashing liquid

		PEC values 30 days [mg · kg_{wwt}^{-1}]		PEC/PNEC	
		DT_{50} = 30 d	DT_{50} = 15.08 d	DT_{50} = 30 d	DT_{50} = 15.08 d
Professional use					
Laundry from hospitals	**Tier 1[1]**	3.81E-02	2.86E-02	0.62	0.47
	Tier 2[2]	1.22E-02	9.17E-03	0.20	0.15
Cleaning of industrial and public areas	**Tier 1[1]**	2.65E-02	1.99E-02	0.43	0.33
	Tier 2[2]	8.50E-03	6.37E-03	0.14	0.10
Cleaning of health care areas	**Tier 1[1]**	9.96E-03	7.48E-03	0.16	0.12
	Tier 2[2]	3.22E-03	2.41E-03	0.05	0.04
Total professional uses	**Tier 1[1]**	7.45E-02	5.59E-02	**1.22**	0.92
	Tier 2[2]	2.38E-02	1.79E-02	0.39	0.29
Non-professional use					
Laundry	**Tier 1[1]**	4.52E-02	3.40E-02	0.74	0.56
	Tier 2[2]	1.45E-02	1.09E-03	0.24	0.18
Cleaning of tiles, floor, sinks, lavatory, etc.	**Tier 1[1]**	9.30E-03	6.98E-03	0.15	0.11
	Tier 2[2]	3.01E-03	2.25E-03	0.05	0.04
Total non-professional uses	**Tier 1[1]**	5.45E-02	4.09E-02	0.89	0.67
	Tier 2[2]	1.74E-02	1.31E-02	0.29	0.21
Total from professional and domestic uses					
TOTAL Tier 1[1]		1.29E-01	9.69E-02	**2.11**	**1.59**
TOTAL Tier 2[2]		4.12E-02	3.10E-02	0.68	0.51

[1] Tier 1: 3.13% of the STP influent residues being present in STP sludge
[2] Tier 2: 1% of the STP influent residues being present in STP sludge

Table 2.2.2.5-5: PEC/PNEC ratios for Biphenyl-2-ol (soil compartment) in Preventol O Extra used in fluids for paper production

		PEC values (30 days) [1] (mg/kg $_{wwt}$)		PEC/PNEC	
		DT_{50} = 30 d	DT_{50} = 15.08 d	DT_{50} = 30 d	DT_{50} = 15.08 d
Printing and writing	**Tier1[2]**	1.00E-01	7.52E-02	**1.64**	**1.23**
	Tier 2[3]	3.20E-02	2.40E-02	0.52	0.39
Tissue	**Tier1[2]**	9.21E-02	6.92E-02	**1.51**	**1.14**
	Tier 2[3]	2.94E-02	2.21E-02	0.48	0.36
News print	**Tier1[2]**	1.15E-01	8.66E-02	**1.89**	**1.42**
	Tier 2[3]	3.68E-02	2.77E-02	**0.60**	0.45
Total	**Tier1[2]**	3.07E-01	2.31E-01	**5.05**	**3.79**
	Tier 2[3]	9.82E-02	7.38E-02	**1.61**	**1.21**

[1] Fraction of additives with a.i. (market share) = 0.5; (see point 2.2.2.4)
[2] Tier 1: 3.13% of the STP influent residues being present in STP sludge
[3] Tier 2: 1% of the STP influent residues being present in STP sludge

Preventol ON Extra Preservative Solution

Table 2.2.2.5-6: PEC/PNEC ratios for Biphenyl-2-ol (soil compartment) in Preventol ON Extra Preservative Solution used as preservative for additives

		PEC values (30 days)[1] (mg/kg $_{wwt}$)		PEC/PNEC	
		DT_{50} = 30 d	DT_{50} = 15.08 d	DT_{50} = 30 d	DT_{50} = 15.08 d
Printing and writing	**Tier1[2]**	4.50E-03	3.38E-03	0.074	0.055
	Tier 2[3]	1.44E-03	1.08E-03	0.024	0.018
Tissue	**Tier1[2]**	4.17E-03	3.13E-03	0.068	0.051
	Tier 2[3]	1.34E-03	1.00E-03	0.022	0.016
News print	**Tier1[2]**	5.21E-03	3.91E-03	0.085	0.064
	Tier 2[3]	1.69E-03	1.26E-03	0.028	0.021
Total	**Tier1[2]**	1.39E-02	1.04E-02	0.228	0.073
	Tier 2[3]	4.47E-03	3.35E-03	0.171	0.055

[1] Fraction of additives with a.i. (market share) = 0.5; (see point 2.2.2.4)
[2] Tier 1: 3.13% of the STP influent residues being present in STP sludge
[3] Tier 2: 1% of the STP influent residues being present in STP sludge

PEC/PNEC ratios for soil in Preventol O Extra used as dishwashing liquid are < 1 when the Tier 2 is taken into account.

The PEC/PNEC ratios are < 1 in Preventol O Extra used in fluids for paper production using the Tier 2 scenario and the DT_{50} = 15.08 days assumption. However, for the total of scenarios the PEC/PNEC ratio is > 1 at Tier 1 and 2.

When the Preventol ON Extra Preservative Solution is used as preservative for additives, PEC/PNEC ratios for soil of far below 1 are achieved using the very conservative Tier 1 PEC.

No relevant risk for soil organisms is indicated due to the use of Biphenyl-2-ol as In-can preservative.

Groundwater compartment

According the EU TGD (European Commission, 2003), the predicted concentration of the active substance in soil pore water is taken as a surrogate estimate of the potential concentration in groundwater. No accepted ecological endpoints have been established to enable characterisation of risk to the groundwater compartment (European Commission, 2003). However, the groundwater directive (Directive 2006/118/EC) stipulates a maximum acceptable concentration for pesticides in groundwater of 0.1 $\mu g \cdot L^{-1}$. The PECs values are given in Tables 2.2.2.5-7, 2.2.2.5-8, and 2.2.2.5-9.

Preventol O Extra

The following Biphenyl-2-ol PEC values for the machine wash scenario have been calculated with a maximum concentration of 5000 mg Biphenyl-2-ol/L.

Table 2.2.2.5-7: PEC values for Biphenyl-2-ol (groundwater) in Preventol O Extra used as dishwashing liquid

		PEC groundwater [mg · L^{-1}]		PEC groundwater [µg · L^{-1}]	
		DT_{50} = 30 d	**DT_{50} = 1 d**	**DT_{50} = 30 d**	**DT_{50} = 1 d**
Professional use					
Laundry from hospitals	**Tier 1[1]**	2.01E-03	1.02E-03	**2.01**	**1.02**
	Tier 2[2]	6.48E-04	3.30E-04	**0.65**	**0.33**
Cleaning of industrial and public areas	**Tier 1[1]**	1.40E-03	7.13E-04	**1.40**	**0.71**
	Tier 2[2]	4.52E-04	2.31E-04	**0.45**	**0.23**
Cleaning of health care areas	**Tier 1[1]**	5.30E-04	2.70E-04	**0.53**	**0.27**
	Tier 2[2]	1.75E-04	8.91E-05	**0.18**	0.09
Total professional use	**Tier 1[1]**	3.92E-03	2.00E-03	**3.92**	**2.00**
	Tier 2[2]	1.26E-03	6.42E-04	**1.26**	**0.64**
Non-professional use					
Laundry	**Tier 1[1]**	2.38E-03	1.22E-03	**2.38**	**1.22**
	Tier 2[2]	7.68E-04	3.91E-04	**0.77**	**0.39**
Cleaning of tiles, floor, sinks, lavatory, etc.	**Tier 1[1]**	4.95E-04	2.52E-04	**0.49**	**0.25**
	Tier 2[2]	1.64E-04	8.35E-05	**0.16**	0.08
Total non-professional use	**Tier 1[1]**	2.87E-03	1.46E-03	**2.87**	**1.46**
	Tier 2[2]	9.23E-04	4.71E-04	**0.92**	**0.47**
Total from professional and domestic uses					
Tier 1[1]		6.78E-03	3.46E-03	**6.78**	**3.46**
Tier 2[2]		2.17E-03	1.11E-03	**2.17**	**1.11**

[1] Tier 1: 3.13% of the STP influent residues being present in STP sludge
[2] Tier 2: 1% of the STP influent residues being present in STP sludge

Table 2.2.2.5-8: PEC values for Biphenyl-2-ol as paper additives (groundwater) in Preventol O Extra used in fluids for paper production

		PEC values (30 days) [1] (mg/L)		PEC values [µg·L^{-1}]	
		DT_{50} = 30 d	DT_{50} = 15.08 d	DT_{50} = 30 d	DT_{50} = 15.08 d
Printing and writing	**Tier1[2]**	5.26E-03	2.68E-03	**5.26**	**2.68**
	Tier 2[3]	1.68E-03	8.57E-04	**1.68**	**0.86**
Tissue	**Tier1[2]**	4.84E-03	2.47E-03	**4.84**	**2.47**
	Tier 2[3]	1.55E-03	7.90E-04	**1.55**	**0.79**
News print	**Tier1[2]**	6.06E-03	3.09E-03	**6.06**	**3.09**
	Tier 2[3]	1.94E-03	9.89E-04	**1.94**	**0.99**
Total	**Tier1[2]**	1.62E-02	8.24E-03	**16.2**	**8.24**
	Tier 2[3]	5.17E-03	2.64E-03	**5.17**	**2.64**

[1] Fraction of additives with a.i. (market share) = 0.5; (see point 2.2.2.4)
[2] Tier 1: 3.13% of the STP influent residues being present in STP sludge
[3] Tier 2: 1% of the STP influent residues being present in STP sludge

Preventol ON Extra Preservative Solution

Table 2.2.2.5-9: PEC values for Biphenyl-2-ol as paper additives (groundwater) in Preventol ON Extra Preservative Solution used as preservative for additives

		PEC values (30 days) [1] (mg/L)		PEC values [µg·L^{-1}]	
		DT_{50} = 30 d	DT_{50} = 15.08 d	DT_{50} = 30 d	DT_{50} = 15.08 d
Printing and writing	**Tier1[2]**	2.37E-04	1.21E-04	**0.24**	**0.12**
	Tier 2[3]	7.64E-05	3.89E-05	0.08	0.04
Tissue	**Tier1[2]**	2.21E-04	1.13E-04	**0.22**	**0.11**
	Tier 2[3]	7.24E-05	3.69E-05	0.07	0.04
News print	**Tier1[2]**	2.78E-04	1.41E-04	**0.28**	**0.14**
	Tier 2[3]	9.24E-05	4.71E-05	0.09	0.05
Total	**Tier1[2]**	7.36E-04	3.75E-04	**0.74**	**0.38**
	Tier 2[3]	2.41E-04	1.23E-04	**0.24**	**0.12**

[1] Fraction of additives with a.i. (market share) = 0.5; (see point 2.2.2.4)
[2] Tier 1: 3.13% of the STP influent residues being present in STP sludge
[3] Tier 2: 1% of the STP influent residues being present in STP sludge

The results of the porewater calculation indicate that Biphenyl-2-ol presents a potentially acceptable risk of groundwater contamination when compared against the 0.1 µg/L criteria stipulated for biocides under Groundwater Directive 2006/118/EC98/8/EC for Biphenyl-2-ol (Preventol O Extra) used as dishwashing liquid and used in fluids for paper production, and for Biphenyl-2-ol (Preventol ON Extra Preservative Solution) used as preservative for additives.

However, it should be noted that the pore water calculation method is a necessarily simplistic

approach neglecting transformation and dilution in deeper soil layers. A more realistic, higher-tier assessment of the potential for groundwater contamination associated with soil applications of Biphenyl-2-ol has also been carried out using the simulation model FOCUS-PEARL. The calculated PEC_{gw} values (80^{th} percentiles of the annual average concentrations in the percolate at 1 m soil depth) of Biphenyl-2-ol were below the drinking water threshold value of 0.1 µg/L in all scenarios described by the FOCUS groundwater workgroup (Table 2.2.2.5-10).

Table 2.2.2.5-10: Predicted 80^{th} percentile concentrations for Biphenyl-2-ol in groundwater

FOCUS Scenarios		
	Concentration closest to the 80^{th} percentile [µg·L^{-1}]	
	Grassland (Alfalfa)	Arable land (Maize)
Châteaudun	<0.0001	<0.0001
Hamburg	<0.0001	0.0010
Jokioinen	<0.0001	n.a.
Kremsmünster	<0.0001	0.0007
Okehampton	<0.0001	0.0031
Piacenza	<0.0001	0.0010
Porto	<0.0001	<0.0001
Sevilla	<0.0001	<0.0001
Thiva	<0.0001	<0.0001

It is therefore concluded that Biphenyl-2-ol does not represent a risk to groundwater following the application of sewage sludge to land for the worst of the cases.

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

A flow-through study was conducted to evaluate the bioconcentration of Biphenyl-2-ol in zebra fish (*Danio rerio*). The arithmetic means of five consecutive steady-state BCF were 21.7 (wet weight), 114-115 (lipid content), indicating a negligible potential of the test substance to bioaccumulate. The achievement of steady-state conditions during the uptake (53 h exposure) phase as well as the consecutive depuration (19 h) were rapid processes.

A risk due to the proposed uses of Biphenyl-2-ol can be ruled out, since these data show that Biphenyl-2-ol does not accumulate in the environment. There is no need to assess this exposure route further.

A secondary exposure of Biphenyl-2-ol to man via the food chain can be excluded due to low tonnage of the biocidal product used in whole Europe, rapid degradation in water and minimum amounts which reach the environmental compartments. A risk due to the proposed uses of Biphenyl-2-ol can be ruled out, since these data show that Biphenyl-2-ol does not accumulate in the environment. There is no need to assess this exposure route further.

2.2.2.6. Assessment of endocrine disruptor properties

In relation to the potential of Biphenyl-2-ol to interfere with the hormone system, Biphenyl-2-

ol is present in one of the documents-lists of the Commission staff working document on implementation of the Community Strategy for Endocrine Disrupters - a range of substances suspected of interfering with the hormone systems of humans and wildlife (COM(2004) 1372), and cited as "candidate substance" for a first-in depth study. No endocrine disruption effect was reported in this document or in the following (COM(2007) 1635).

In addition, the prolonged toxicity of Biphenyl-2-ol to fathead minnow (*Pimephales promelas*) was tested in a reproductive performance test by [redacted] (2002). In the test, measures of fecundity were assessed daily. Viability of resultant embryos was assessed in animals held in the same treatment regime to which the adults were exposed. A suite of histological and biological endpoints, that potentially are directly reflective of effects associated with endocrine disrupting chemicals, was also evaluated. The results of the study show that Biphenyl-2-ol does not indicate any adverse effects on reproductive parameters of pair-breeding fathead minnows up to a nominal test concentration of 50 µg a.i./L. With regard to the induction of the biomarker vitellogenin as an early indicator of possible endocrine modulation, no substance-related effects were noted compared to the positive control 17α-ethynylestradiol.

Result of the first EU evaluation project on potential endocrine substances (EUROPEAN COMMISSION, STUDY ON THE SCIENTIFIC EVALUATION OF 12 SUBSTANCES IN THE CONTEXT OF ENDOCRINE DISRUPTER PRIORITY LIST OF ACTIONS, 2002).

From the summary for humans: "The available data from in vivo studies in laboratory mammals (using oral or dermal exposure routes) indicates that Biphenyl-2-ol does not cause adverse effects on reproductive and developmental endpoints (which may be endocrine mediated) at exposure levels where general systemic toxic effects are observed. The lowest NOEL in the in vivo studies was 250 $mg \cdot kg_{bw}^{-1} \cdot day^{-1}$ for foetotoxic and developmental effects. Limited exposure data for workers and consumers has been located."

For wildlife: "The available aquatic effects data shows that the threshold exposure concentrations of Biphenyl-2-ol above which reproduction of the invertebrate *Daphnia magna* and fish (fathead minnow) are reduced (NOECs = 0.036 $mg \cdot L^{-1}$ and 0.009 $mg \cdot L^{-1}$ respectively) are lower than the threshold levels for general toxic effects (i.e. lethality). The effects observed on reproduction in fish were evidently not oestrogen mediated. However, there is no information on the mechanism of action for the effects on reproduction observed in *Daphnia magna*."

The results of this EU evaluation project were also confirmed in a peer evaluation done by the CSTEE (2003)

Thus, it can be stated that, to date, no evidence of endocrine disruption activity can be attributed to Biphenyl-2-ol.

2.3. Overall conclusions

The outcome of the assessment for Biphenyl-2-ol in Product-type 6 is specified in the BPC opinion following discussions at the [number of BPC meeting] meeting of the Biocidal Products Committee (BPC). The BPC opinion is available from the ECHA website.

2.4. List of endpoints

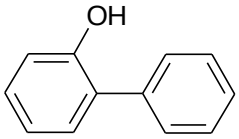
The most important endpoints, as identified during the evaluation process, are listed in Appendix I.

Appendix I: List of endpoints

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

Active substance (ISO Name)	*o*-Phenylphenol (ISO) Synonyms: Biphenyl-2-ol (EINECS name), OPP
Product-type	Preservatives for products during storage

Identity

Chemical name (IUPAC)	2-Phenylphenol
Chemical name (CA)	[1,1'-Biphenyl]-2-ol
CAS No	90-43-7
EC No	201-993-5
Other substance No.	CIPAC No. 246
Minimum purity of the active substance as manufactured (g/kg or g/l)	≥ 995 g/kg
Identity of relevant impurities and additives (substances of concern) in the active substance as manufactured (g/kg)	None
Molecular formula	$C_{12}H_{10}O$
Molecular mass	170.2 g/mol
Structural formula	

Physical and chemical properties

Melting point (state purity)	56.7 ºC (purity: 99.9%)
Boiling point (state purity)	287 ºC (purity: 99.9%)
Thermal stability / Temperature of decomposition	Exothermal decomposition starts at 290 °C. As no decomposition of the test substance could be observed below 150 °C, Biphenyl-2-ol is considered to be stable at room temperature.
Appearance (state purity)	Colourless solid flakes with slight phenolic odour (purity: 99.9%)
Relative density (state purity)	1.237 at 20 °C (purity: 99.9%)
Surface tension (state temperature and concentration of the test solution)	58.72 mN/m at 20.1 ºC (0.558 g/L)
Vapour pressure (in Pa, state temperature)	0.474 Pa at 20 °C, 0.906 Pa at 25 °C

Henry's law constant (Pa m^3mol^{-1})	Ratio between vapour pressure and water solubility: 0.15 Pa×m^3×mol^{-1} at 20 °C and pH 5 0.14 Pa×m^3×mol^{-1} at 20 °C and pH 7 0.13 Pa×m^3×mol^{-1} at 20 °C and pH 9
Solubility in water (g/L or mg/L, state temperature)	Results at pH 5: 0.43 g/L at 10°C 0.53 g/L at 20°C 0.70 g/L at 30°C Results at pH 7: 0.45 g/L at 10°C 0.56 g/L at 20°C 0.73 g/L at 30°C Results at pH 9: 0.52 g/L at 10°C 0.64 g/L at 20°C 0.84 g/L at 30°C
Solubility in organic solvents (in g/L or mg/L, state temperature)	Results at 20 °C: *n*-heptane: 50.3 g/L acetone, 1,2-dichloroethane, ethyl acetate, methanol, *p*-xylene: > 250 g/L No significant temperature dependence is expected.
Stability in organic solvents used in biocidal products including relevant breakdown products	Biphenyl-2-ol as manufactured does not include an organic solvent in PT 2, 3, 4, 6, 7, 10 and 13. Therefore a study regarding stability in organic solvents does not apply. The b. p. for PT 1 and 9 contains an organic solvent.
Partition coefficient (log P_{OW}) (state temperature)	Log P_{OW}: 3.18 at 22.51 °C. (more accurate value which is to be used exclusively) "the log P_{OW} of Biphenyl-2-ol is nearly independent from pH value when investigated at pH 5, pH 7 and pH 9."
Dissociation constant	pK = 9.5 at 20 °C
UV/VIS absorption (max.) (if absorption > 290 nm state ε at wavelength)	Molar absorptivity: 12800 at 245 nm 8200 at 267 nm The UV-visible spectrum show a band with a maximum at 285 nm and a bandwidth of 40 nm, therefore a short absorption appears above 290 nm.
Flammability or flash point	Biphenyl-2-ol is not highly flammable, does not liberate gases in hazardous amounts when contact with water, does not deliver indications of pyrophoric properties and does not undergo spontaneous combustion.
Explosive properties	Based on scientific judgement it is certified that due to the structural formula Biphenyl-2-ol contains neither oxidising groups nor other chemically instable functional groups. Thus Biphenyl-2-ol is incapable of rapid decomposition with evolution of gases or release of heat, i.e. the solid material does not present any risk for explosion.

Oxidising properties	Based on scientific judgement it is certified that due to the structural formula Biphenyl-2-ol does not contain oxidising groups in its molecular backbone and thus may not react exothermically with a combustible material. Therefore Biphenyl-2-ol does not have oxidising properties.
Auto-ignition or relative self ignition temperature	Biphenyl-2-ol does not undergo spontaneous combustion

Classification and proposed labelling

with regard to physical hazards	None
with regard to human health hazards	Carc 2: H351; Eye Irrit. 2: H319; Skin Irrit. 2: H315; STOT SE 3: H335
with regard to environmental hazards	Aquatic Acute 1: H400; Aquatic Chronic 1: H410

Chapter 2:Methods of Analysis

Analytical methods for the active substance

Technical active substance (principle of method)	Biphenyl-2-ol is separated by means of gas chromatography using flame ionisation detection. The quantitative evaluation is carried out by area normalisation with consideration of water content and non-volatile components.
Impurities in technical active substance (principle of method)	The analytical method for the determination of impurities in the active substance is confidential. This information is provided separately in the confidential part of the dossier.

Analytical methods for residues

Soil (principle of method and LOQ)	HPLC-MS/MS; LOQ = 5 µg/kg
Air (principle of method and LOQ)	GC-MS; LOQ = 0.35 µg/m^3.
Water (principle of method and LOQ)	Surface and drinking water: HPLC-MS/MS; LOQ = 0.1µg/L
Body fluids and tissues (principle of method and LOQ)	Not applicable since Biphenyl-2-ol is not classified as toxic or highly toxic.
Food/feed of plant origin (principle of method and LOQ for methods for monitoring purposes)	Citrus Fruit: GC-MS; LOQ = 0.1 µg/kg QuEChERS Method: EN155662:2008
Food/feed of animal origin (principle of method and LOQ for methods for monitoring purposes)	Meat: GC-MS/MS; LOQ = 0.01 µg/kg

Chapter 3:Impact on Human Health

Absorption, distribution, metabolism and excretion in mammals

Rate and extent of oral absorption:	100% is assumed
Rate and extent of dermal absorption*:	43% is assumed
Distribution:	Extensively metabolized. Poorly distributed.
Potential for accumulation:	Low potential for bioaccumulation.
Rate and extent of excretion:	Quickly excreted (12 - 24 h post-dosing).
Toxicologically significant metabolite(s)	phenylhydroquinoneglucuronide and 2,4'-dihydroxybiphenyl-sulfate

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

Acute toxicity

Rat LD_{50} oral	2730 mg/kg bw
Rat LD_{50} dermal	> 2000 mg/kg bw
Rat LC_{50} inhalation	> 36 mg/m^3 (0.036 mg/L)

Skin corrosion/irritation	Skin Irrit. 2 (H315: Causes skin irritation)
Eye irritation	Eye Irrit. 2 (H319: Causes serious eye irritation)
Respiratory tract irritation	No data
Skin sensitisation (test method used and result)	Non Sensitizer (Buehler test on Guinea pigs; 0/10 Number of animals sensitised/total number of animals) Non Sensitizer (Magnusson-Kligman test on Guinea pigs; 0/20 Number of animals sensitised/total number of animals)
Respiratory sensitisation (test method used and result)	No data

Repeated dose toxicity

Short term

Species/ target / critical effect	Oral: New Zealand White rabbits / increased mortality (13%), gross pathologic alterations and histopathologic alterations Dermal: Fischer 344 rats/ no systemic effects in any dose group

Relevant oral NOAEL / LOAEL	NOAEL = 100 mg/kg bw/day (teratogenicity oral study) LOAEL = 250 mg/kg bw/day (teratogenicity oral study)
Relevant dermal NOAEL / LOAEL	NOAEL = 1000 mg/kg bw/day (21-day dermal study)
Relevant inhalation NOAEL / LOAEL	No data

Subchronic

Species/ target / critical effect	Rats /urinary blader/ increased incidence of simple urinary bladder hyperplasia in males and the increased incidence of urinary bladder transitional cell carcinoma in males
Relevant oral NOAEL / LOAEL	NOAEL = 39 mg/kg bw/day (2-years oral study) LOAEL = 200 mg/kg bw/day (2-years oral study)
Relevant dermal NOAEL / LOAEL	No Data
Relevant inhalation NOAEL / LOAEL	No Data

Long term

Species/ target / critical effect	Rats /urinary blader/ increased incidence of simple urinary bladder hyperplasia in males and the increased incidence of urinary bladder transitional cell carcinoma in males
Relevant oral NOAEL / LOAEL	NOAEL = 39 mg/kg bw/day (2-years oral study) LOAEL = 200 mg/kg bw/day (2-years oral study)
Relevant dermal NOAEL / LOAEL	No Data
Relevant inhalation NOAEL / LOAEL	No Data

Genotoxicity	*In vitro* Biphenyl-2-ol is considered to be nonmutagenic but it was clastogenic in Chinese hamster ovary cells at cytotoxic concentrations *In vivo* Biphenyl-2-ol is not genotoxic or mutagenic in vivo.

Carcinogenicity

Species/type of tumour	Fischer 344 rat/ neoplasia in urinary bladder (male animals only) B6C3F1 mice/ hepatocellular adenomas(male animals only) The tumours found in mice are not predictive of carcinogenicity for humans. The relevance of urinary bladder tumours in male rats cannot be completely excluded
Relevant NOAEL/LOAEL	200 mg/kg body wt/day 500 mg/kgBW/day

Reproductive toxicity

Developmental toxicity

Species/ Developmental target / critical effect	New Zealand White rabbits/ No recorded effect on development parameters/ No effects on foetal development
Relevant maternal NOAEL	NOAEL = 100 mg/kg/day
Relevant developmental NOAEL	NOAEL = 250 mg/kg/day

Fertility

Species/critical effect	RatCD Sprague-Dawley/ No recorded effect on reproductive parameters/ bladder calculi, urothelial hyperplasia
Relevant parental NOAEL	NOAEL = 35 mg / kg bw / day
Relevant offspring NOAEL	NOAEL = 125 mg / kg bw / day
Relevant fertility NOAEL	NOAEL = 457 mg / kg bw / day

Neurotoxicity

Species/ target/critical effect	No data

Developmental Neurotoxicity

Species/ target/critical effect	No data

Immunotoxicity

Species/ target/critical effect	No data

Developmental Immunotoxicity

Species/ target/critical effect	No data

Other toxicological studies

Human data:
allergic contact dermatitis or contact sensitivity to Biphenyl-2-ol
Other/special studies:
Biphenyl-2-ol is carcinogenic in urinary bladder in alkaline conditions in rats

Medical data

No data

Summary

	Value	Study	Safety factor
$AEL_{long\text{-}term}$	0.4 mg/kg bw/day	2-years oral study	100
$AEL_{medium\text{-}term}$	0.4 mg/kg bw/day	2-years oral study	100
$AEL_{short\text{-}term}$	1 mg/kg bw/day	teratogenicity oral study in New Zealand White rabbits	100
ADI[2]	0.4 mg/kg bw/day	2-years oral study	100
ARfD	No relevant		

MRLs

Relevant commodities	

Reference value for groundwater

According to BPR Annex VI, point 68	

Dermal absorption

Study (*in vitro/vivo*), species tested	Dermal absorption, excretion in vivo, humans.
Formulation (formulation type and including concentration(s) tested, vehicle)	0.4% (w/v) Biphenyl-2-ol solution in isopropyl alcohol
Dermal absorption values used in risk assessment	43% (100% in corrosive products)

Acceptable exposure scenarios (including method of calculation)

Formulation of biocidal product	Not assessed.
Intended uses	0.1 - 0.5 % w/w Biphenyl-2-ol (Preventol O Extra); 1,000 - 5,000 ppm 0.0225% w/w Biphenyl-2-ol (Preventol ON Extra Preservative Solution); 225 ppm minimum In-can preservatives used in Liquid Detergents. In-can preservatives for materials used in paper manufacture. In-can preservatives for products other than detergents

[2]If residues in food or feed.

Industrial users	Formulation & bottling of preserved product: Mix and Load model 7, TNsG 2002, pp.141, revised. PPE (RPE if aerosol or dust is produced) required when handling biocidal product. RMMs recommended to reduce airborne levels. No risk.
Professional users	Glass cleaner: Consumer product spraying and dusting model 2, 50 min. (hand held trigger spray) TNsG 2002, pp.198, Surface disinfection model 1 & 3, 220 min.,TNsG 2002, pp.174, 176. Paper manufacture: Mix and Load model 7, 1 hour, TNsG 2002, pp.141, revised. PPE may be required. No risk.
Non professional users	ConsExpo 4.1: hand laundry, hand dishwashing and surface cleaning using liquid spray. No risk.
General public	ConsExpo 4.1: exposure to textiles washed with detergents, ingestion of dried residues of cleaning agents in dishes. No risk.
Exposure via residue in food	Human exposure to Biphenyl-2-ol residues in food and feedstuffs after application of preserved products cannot be excluded.

Chapter 4:Fate and Behaviour in the Environment

Route and rate of degradation in water

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 $t_{1/2}$> 1 year
Photolytic / photo-oxidative degradation of active substance and resulting relevant metabolites	Biphenyl-2-ol: Experimental DT_{50}: 0.3 days (pure water) Environmental DT_{50} [Phoenix, AZ, USA]: 1.7 days Environmental DT_{50} [Athens, Greece]: 2.6 days Diketohydroxy-compound (max. 13.6% at day 1, < 5% after 7 days): Experimental DT_{50}: 1.3 days (pure water) Environmental DT_{50} [Phoenix, AZ, USA]: 7.2 days Environmental DT_{50} [Athens, Greece]: 11.1 days
Readily biodegradable (yes/no)	Yes; 71-76% biodegradation after 28 d 100% biodegradation after 14 d 100% biodegradation after 10 d (inherent test)

Inherent biodegradable (yes/no)	
Biodegradation in freshwater	
Biodegradation in seawater	Not relevant since Biphenyl-2-ol is not used or released in the marine environment at considerable amounts. Therefore, a seawater biodegradation test is not required.
Non-extractable residues	Not relevant due to indoor use.
Distribution in water / sediment systems (active substance)	Not relevant due to indoor use. Estimation from screening experiments: < 14 d
Distribution in water / sediment systems (metabolites)	Not relevant due to indoor use.

Route and rate of degradation in soil

Mineralization (aerobic)	Results are given as mean value of duplicate test of [phenyl-UL-^{14}C]-labelled Biphenyl-2-ol in % of the applied radioactivity for day 127 of incubation under aerobic conditions: 9.6% (n = 2, 20 ± 1 °C)
Laboratory studies (range or median, with number of measurements, with regression coefficient)	$DT_{50\ lab}$ (20 °C, aerobic): 2.7 hours* (n = 1), r^2 = 0.994 15.08 days (recalculated considering a biphasic approach) DT_{90lab} (20 °C, aerobic): 8.81 hours* (n = 1), r^2 = 0.994 0.34 days (recalculated considering a biphasic approach)
degradation in the saturated zone:	
Field studies(state location, range or median with number of measurements)	Not relevant due to indoor use
Anaerobic degradation	Not relevant due to indoor use.
Soil photolysis	Not relevant due to indoor use.
Non-extractable residues	77.4% at day 127 (n = 2, 20 ± 1 °C)
Relevant metabolites - name and/or code, % of applied a.i. (range and maximum)	No relevant metabolites
Soil accumulation and plateau concentration	Not relevant due to indoor use

Adsorption/desorption

Ka , Kd Ka_{oc} , Kd_{oc} pH dependence (yes / no) (if yes type of dependence)	Adsorption, OECD Guideline 106: K_f: 7.04 , 7.47, 8.53, 11.66 (n = 4) K_{oc}: 252, 355, 389, 393 (n = 4, mean: 347) Desorption 1: K_{fdes}: 9.36, 16.42, 16.78, 18.62 (n = 4) K_{ocdes}: 334, 621, 699, 864 (n = 4) Adsorption, OECD Guideline 121: estimated mean K_{oc} value: 346.7 K_d was not reported pH dependence was not apparent

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	
Photo-oxidative degradation in air	DT_{50} = 0.59 days
Volatilization	Not relevant because there is no relevant release of the compound to the air compartment

Reference value for groundwater

According to BPR Annex VI, point 68	

Monitoring data, if available

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

Surface water (indicate location and type of study)	**Municipal sewage plant Steinhäule located on the Danube River in southern Germany.** The plant has mechanical purification devices (primary clarification), actived sludge treatment, biological nitrate removal (nitrification/denitrifcation), biological phosphate removal and final settlement tanks as main cleaning steps. Concentrations of Biphenyl-2-ol in 24 h influent and effluent samples from 10/11 March 1998 **Substance (µg/L)** / **Influent 10/11 March (8 a.m-8a.m)** / **Efluent 10/11 March (4 p.m-4 p.m)** Biphenyl-2-ol / 1.54 ± 0.349 / < 0.015
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			
Oncorhynchus mykiss	96 hours	Mortality	LC_{50} = 4.0 mg/L Dill *et al*. (1985)
Pimephales promelas	21 days	Reproduction	NOEC = 0.036 mg/L [redacted] (2002)
Invertebrates			
Daphnia magna	48 hours	Mortality	LC_{50} = 2.7 mg/L Dill *et al.* (1985)
Daphnia magna	21 days	Survival & repro-duction	NOEC = 0.006 mg/L Bruns (2001)
Algae			
Pseudokirchneriella subcapitata	72 hours	Growth inhibition	E_rC_{50} = 3.57 mg/L E_bC_{50} = 1.35 mg/L NOEC = 0.468 mg/L Hicks (2001)
Microorganisms			

Activated sludge	3 hours	Inhibition of respiratory rate	EC_{50} = 56 mg/L Klecka, Landi, and Bodner (1985)

Effects on earthworms or other soil non-target organisms

Acute toxicity to earthworms ..	LC_{50} (14 days) = 198.2 mg/kg Moser & Scheffczyk (2004)
Reproductive toxicity to earthworms	No study available

Effects on soil micro-organisms

Nitrogen mineralization	EC_{50} (28 days) = 633.5 mg a.s/kg d.wt. soil Schulz.L (2012)
Carbon mineralization	

Effects on terrestrial vertebrates

Acute toxicity to mammals	LD_{50} = 2733 mg/kg bw (♂ +♀) [redacted] (1994)
Chronic toxicity to mammals (Annex IIA, point VI.6.5)	NOAEL = 300 mg/kg diet (1 year) Cosse *et al*. (1990)
Acute toxicity to birds	LC_{50} > 2250 mg/kg bw [redacted] (1986)
Dietary toxicity to birds	LD_{50} > 5620 mg/kg diet [redacted] (1986)
Reproductive toxicity to birds	No study available

Effects on honeybees

Acute oral toxicity	No study available
Acute contact toxicity	No study available

Effects on other beneficial arthropods

Acute oral toxicity	No study available
Acute contact toxicity	No study available
Acute toxicity to ……..	No study available

Bioconcentration

Bioconcentration factor (BCF)	BCF = 21.7 (whole fish), 114-115 (lipid content) Caspers (1999)
Depuration time(DT_{50})	< 1 h (5 µg/L) / < 19 h (50 µg/L)

Depuration time(DT_{90})	2 h (5 µg/L) / < 6 h (50 µg/L)
Level of metabolites (%) in organisms accounting for > 10 % of residues	No metabolites identified

Chapter 6:Other End Points

Appendix II: List of Intended Uses

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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 3.	interval between applications (min)	g a.s./L min max	water L/m^2 min max	g a.s./m^2 min max	
In-can preservative PT 6	Preventol O Extra	Bacteria The test period was: 3 weeks; one contamination per week	AL	995 g/kg	addition	–	?	1 g/L – 5 g/L	–	–	-
In-can preservative PT 6	Preventol ON Extra Preservative Solution	Bacteria The test period was 5, 6 weeks (with weekly contaminations)	AL	177 g/kg	addition	–	?	0.225 g/L	–	–	paper manufacture (min)

Appendix III: List of studies

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

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A2.6(01) IIA, II 2.6	Stroech, K.D.	1991	Preventol O Extra (2-Phenylphenol) Synthesis. Date: 1991-02-19 **CONFIDENTIAL**	Bayer AG, Leverkusen, Germany	--	No	No	Yes	LANXESS Deutschland GmbH
A2.7(01) IIA, II 2.7	Anonymous	2000	Preventol O Extra in flakes. Date: 2000-02-11	BU, Material Protection Products, Leverkusen, Germany	--	No	No	Yes	LANXESS Deutschland GmbH
A2.7(01) IIA, II 2.7 also filed: A2.8(01)	Erstling, K.	2005	Determination of main and minor components in Preventol O Extra, 5-batch analysis. Date: 2005-02-16 **CONFIDENTIAL**	Bayer Industry Services GmbH & Co. OHG, BIS-SUA-Analytics, Leverkusen, Germany	Study No.: G 05/0009/00 LEV	Yes	No	Yes	LANXESS Deutschland GmbH

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A2.7(02) IIA, II 2.7	Stroech, K.	2014	Quality Control Data from the production plant covering approximately 68 months (Jan. 2009 to Sept. 2014) to derive a specification limit for 2-Phenylphenol (OPP). **CONFIDENTIAL**	LANXESS Deutschland GmbH Köln, Germany	--	Yes	--	--	LANXESS Deutschland GmbH
A2.8(02) IIA, II 2.8	Feldhues, E.	2006	Additional information on study report No. 2005/0009/00, Determination of main and minor components in Preventol O extra 5-Batch-Analysis. Date: 2006-05-12 CONFIDENTIAL	Bayer Industry Services GmbH & Co KG, BIS-SUA-PUA I, Leverkusen, Germany	--	No	No	Yes	LANXESS Deutschland GmbH

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A3.1.1(01) IIA, III 3.1 also filed: A3.1.2(01) also filed: A3.1.3(01) also filed A3.10(01)	Erstling, K.	2001 a	Physicochemical properties. Date: 2001-09-13 Amended: 2004-12-02, 2006-03-02, 2006-04-24, 2007-06-26	Bayer AG, Leverkusen, Germany	A 00/0068/01 LEV	Yes	No	Yes	LANXESS Deutschland GmbH
A3.1.3(02) IIA, III 3.1	Erstling, K.	2007	Physicochemical properties of Preventol O Extra	Bayer Industry Services, Leverkusen, Germany	2007/0045/02	Yes	No	Yes	LANXESS Deutschland GmbH
A3.2(01) IIA, III 3.2	Olf, G.	2003	Vapour pressure, Physical-Chemical properties. Date: 2003-02-11 Amended: 2003-02-24 2007-06-29	Bayer AG, Leverkusen, Germany	03/003/01	Yes	No	Yes	LANXESS Deutschland GmbH
A3.2(02) IIA, III 3.2 also filed: A7.3.1(01)	Beiell, U.	2004	Preventol O Extra (*o*-Phenylphenol) Calculation of Henry's Law Constant and Photodegradation. Date: 2004-09-27	Dr. Knoell Consult GmbH, Mannheim, Germany	--	No	No	Yes	LANXESS Deutschland GmbH

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A3.3(01) IIA, III 3.3	Stroech, K.	2006	*o*-Phenylphenol / Appearance. Date: 2006-04-11	LANXESS Deutschland GmbH, Leverkusen, Germany	--	No	No	Yes	LANXESS Deutschland GmbH
A3.4(01) IIA, III 3.4	Erstling, K.	2004	Spectral Data of Preventol O Extra. Date: 2004-07-16 Amended: 2004-12-01	Bayer Industry Services, Leverkusen, Germany	A 02/0162/03 LEV	Yes	No	Yes	LANXESS Deutschland GmbH
A3.5(01) IIA, III 3.5	Erstling, K.	2002	Water solubility. Date: 2002-02-15	Bayer AG, Leverkusen, Germany	A 00/0068/02 LEV	Yes	No	Yes	LANXESS Deutschland GmbH
A3.6(01) – also filed: A3.9(01)	Kausler	1991	Partition coefficient, dissociation constant, pH value. Date: 1991-01-09 Amended: 2005-02-03 2007-06-26	Bayer AG, Leverkusen, Germany	A 89/0062/06 LEV	Yes	No	Yes	LANXESS Deutschland GmbH

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A3.6(02) – also filed: A3.9(02)	Erstling, K.	2001 b	Partition coefficient (*n*-octanol/water) / Dissociation constant. Date: 2001-10-23 Amended: 2001-11-14, 2004-12-03 and 2005-01-14 2007-06-28	Bayer AG, Leverkusen, Germany	A 00/0068/03 LEV	Yes	No	Yes	LANXESS Deutschland GmbH
A3.7(01) IIIA, III.1	Jungheim, R.	2004	Solubility of Preventol O Extra in organic solvents. Date: 2004-07-26	Bayer Industry Services, Leverkusen, Germany	A 02/0162/04 LEV	Yes	No	Yes	LANXESS Deutschland GmbH
A3.7(02) IIIA, III.1	Feldhues, E.	2006 a	Statement Solubility of Preventol O Extra in organic solvents, Temperature dependence. Date: 2006-11-20	Bayer Industry Services, BIS-SUA-PUA I, Leverkusen, Germany	--	No	No	Yes	LANXESS Deutschland GmbH
A3.9(03) IIA, III 3.6	Feldhues, E.	2006 b	Statement Partition coefficient n-octanol/water of Preventol O Extra, Temperature and pH dependence. Date: 2006-11-20	Bayer Industry Services, BIS-SUA-PUA I, Leverkusen, Germany	--	No	No	Yes	LANXESS Deutschland GmbH

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A3.11(01) IIA, III 3.8	Heinz, U.	2004	Determination of safety relevant data of Preventol O Extra. Date: 2004-07-12 Amended: 2005-01-14	Bayer Industry Services, Leverkusen, Germany	04/00223	Yes	No	Yes	LANXESS Deutschland GmbH
A3.13(01) IIA, III 3.10	Olf, G.	2004	Surface tension of Preventol O Extra. Date: 2004-09-16	Bayer Technology Services, Leverkusen, Germany	04006/03	Yes	No	Yes	LANXESS Deutschland GmbH
A3.15(01) IIA, III 3.11	Stroech, K.	2004 a	*o*-Phenylphenol / Explosive properties. Date: 2004-07-29	Bayer Chemicals AG, Leverkusen, Germany	--	No	No	Yes	LANXESS Deutschland GmbH
A3.16(01) IIA, III 3.12	Stroech, K.	2004 b	*o*-Phenylphenol / Oxidising properties. Date: 2004-07-29	Bayer Chemicals AG, Leverkusen, Germany	--	No	No	Yes	LANXESS Deutschland GmbH
A3.17(01) IIA, III 3.13 also filed A8.1(02)	Kraus, H.	2006	*o*-Phenylphenol (OPP) / Reactivity towards container material. Date: 2006-05-30	LANXESS Deutschland GmbH, Leverkusen, Germany	--	No	No	Yes	LANXESS Deutschland GmbH

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A4.1(01) IIA, IV 4.1	Feldhues, E.	2005	Validation of analytical methods for the determination of main and minor components in Preventol O Extra. Date: 2005-02-04 Amended: 2006-04-24 **CONFIDENTIAL**	Bayer Industry Services GmbH & Co. OHG, BIS-SUA-Analytics, Leverkusen, Germany	A 02/0162/08 LEV	Yes	No	Yes	LANXESS Deutschland GmbH
A4.1(02) IIA, IV 4.1	Dick, W.	1990 a	Water – Volumetric method. Date: 1990-12-18 **CONFIDENTIAL**	ZF-DZA/Analytik LEV/OAL, Leverkusen, Germany	2011-0131301-90	No	No	Yes	LANXESS Deutschland GmbH
A4.1(03) IIA, IV 4.1	Dick, W.	1990 b	Karl Fischer titrant (KF-T) – Equivalent water concentration-Volumetric method. Date: 1990-12-18 **CONFIDENTIAL**	ZF-DZA/Analytik LEV/OAL, Leverkusen, Germany	2011-0131401-90	No	No	Yes	LANXESS Deutschland GmbH
A4.2(01) IIA, IV 4.2	Brumhard, B.	2004	Method 00829 for the determination of residues of Preventol O Extra in soil by HPLC-MS/MS. Date: 2004-01-05	Bayer Crop Science AG, Monheim am Rhein, Germany	Bayer Method No.: 00829; Report No.: MR- 107/03	Yes	No	Yes	LANXESS Deutschland GmbH

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A4.2(02) IIA, IV 4.2	Feldhues, E.	2005 b	Validation of an analytical method for the determination of Preventol O Extra in air samples. Date: 2005-02-21 Amended: 2007-06-20 2010-01-22	Bayer Industry Services GmbH & Co. OHG, BIS-SUA-Analytics, Leverkusen, Germany	A 02/0162/05 LEV	Yes	No	Yes	LANXESS Deutschland GmbH
A4.2(03) IIA, IV 4.2	Königer, A.	2010	Validation of a GC method for the determination of Preventol O Extra in air. Date: 2010-01-22	CURRENTA GmbH &Co. OHG Services Analytik Leverkusen Germany	2009/0013/01	Yes	--	--	LANXESS Deutschland GmbH
A4.2(04) IIA, IV 4.2	Brumhard, B.	2003	Enforcement method 00828 (MR-100/03) for the determination of Preventol O Extra in surface and drinking water by HPLC-MS/MS. Date: 2003-12-17 Amended: 2005-03-14 2007-07-02	Bayer Crop Science AG, Monheim am Rhein, Germany	Report No.: MR-100/03; Method No.: 00828	Yes	No	Yes	LANXESS Deutschland GmbH

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A4.3(01) IIA, IV 4.3	Stroech, K.	2014	Residue determination of 2-phenylphenol in meat via GC/MS/MS measurement. 2014-06-16, amended 2014-10-23	Lanxess Deutschland GmbH, Köln, Germany		No	No	Yes	LANXESS Deutschland GmbH
A4.3(02) IIA, IV 4.3	Semrau, J	2011	Determination of residues of orthophenylphenol (OPP) and phenylhydroquinone (PHQ) and their conjugates after a single postharvest application of AGF/1-04 in oranges, Southern Europe 2011.	Eurofins Agroscience Services GmbH, Stade, Germany, (), 2011-12-12	Report No.: S11-01940	Yes	No	Yes	Agrupost, Valencia, Spain
A5 IIA 5.4	Russell, A.D., Hugo, W.B. and Ayliffe, G.A.J.	1990	Principles and practice of disinfection, preservation and sterilisation.	--	--	--	Yes	No	Second Edition, Blackwell Scientific Public

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A5.3.1(01) IIA, V 5.3	Bomblies, L. and Wedde, A.	2000	Preventol O Extra (active substance. Determination of the "Minimal Inhibitory Concentration (MIC) against various test microorganisms. Date: 2000-09-16	Labor L+S, Bad-Bocklet-Großenbrach, Germany	01020940	No	No	Yes	LANXESS Deutschland GmbH
A5.3.1(02) IIA, V 5.3	Exner, O.	1997	Preventol O Extra: Determination of bactericidal effectiveness in a qualitative suspension disinfection test in accordance with German Society of Hygiene and Microbiology (DGHM) guidelines. Date: 1997-11-28	Bayer AG, Material Protection Business Unit, Krefeld, Germany	--	No	No	Yes	LANXESS Deutschland GmbH
A6.1.1(01) IIA, VI 6.1.1	[redacted] and [redacted]	1994	Dowicide™ 1 Antimicrobial: Acute Oral Toxicity Study in Fischer 344 Rats. Date: 1994-07-29	Dow Chemical Company	K-001024-057A	Yes	No	Yes	Dow Chemical Company

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A6.1.2(01) IIA, VI 6.1.2	[redacted]	1991	Preventol O Extra (Schuppen) – Acute Dermal Toxicity Study in Male and Female Wistar Rats. Date: 1991-01-09	Bayer AG	19831	Yes	No	Yes	LANXESS Deutschland GmbH
A6.1.3(01) IIA, VI 6.1.3	[redacted] and [redacted]	1992	*ortho*-Phenylphenol: Acute Aerosol Inhalation Toxicity Study in Fischer 344 Rats. Date: 1992-02-24	Dow Chemical Company	K-001024-049	Yes	No	Yes	Dow Chemical Company
A6.1.3(01)	Marple et al.	1978	A Dust Generator for Laboratory Use.	--	*Am. Ind. Hyg. Assoc. J.* **39**: 26-32	--	--	--	--
A6.1.4(01) IIA, VI 6.1.4	[redacted]	1994a	Dowicide™ 1 Antimicrobial: Primary Dermal Irritation Study in New Zealand White Rabbits. Date: 1994-07-29	Dow Chemical Company	K-001024-057B	Yes	No	Yes	Dow Chemical Company

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A6.1.4(02) IIA, VI 6.1.4	[redacted]	1981 b	Report on the test of Preventol O Extra for irritation of the mucous membrane. Date: 1981-11-04	Fraunhofer-Institut für Toxikologie und Aerosol-forschung, Schmallenberg, Germany	T2004666	No	No	Yes	LANXESS Deutschland GmbH
A6.1.5(01) IIA; VI 6.1.5	[redacted]	1994 b	Dowicide™ 1 Antimicrobial: Dermal Sensitization Potential in the Hartley Albino Guinea Pig. Date: 1994-07-29	Dow Chemical Company	K-001024-057E	Yes	No	Yes	Dow Chemical Company
A6.1.5(02) IIA; VI 6.1.5	[redacted] and [redacted]	1984	The Sensitizing Potential of Metalworking Fluid Biocides (Phenolic and Thiazole Compounds) in the Guinea-Pig Maximization Test in Relation to Patch-Test Reactivity in Eczema Patients.	Department of Dermatology, Gentofte Hospital, Hellerup, Denmark	*Fd. Chem Toxic.* **22**(8), pp. 655-660	No	Yes	No	--

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A6.2(01) IIA, VI 6.2	Bartels, M.J., Brzak, K.A., McNett, D. and Shabrang, S.N.	1997	*ortho*-Phenylphenol (OPP): Limited Metabolism Study in Human. Date: 1997-02-03	Dow Chemical Company	HET K-001024-059	Yes	No	Yes	Dow Chemical Company
A6.2(02) IIA, VI 6.2	[redacted] and [redacted]	1997	*ortho*-Phenylphenol (OPP): Metabolism of ^{14}C-Labelled OPP in $B_6B_3F_1$ Mice and Fischer 344 Rats. Date: 1997-02-06	Dow Chemical Company	HET K-001024-060	Yes	No	Yes	Dow Chemical Company
A6.2(03) IIA, VI 6.2	Selim, S.	1996	A Single Open Dose Label Study to Investigate the Absorption and Excretion of ^{14}C/^{13}C-Labeled *ortho*-Phenylphenol Formulation after Dermal Application to Healthy Volunteers. Date: 1996-09-19	Bayer AG	P0995002	Yes (GCP)	No	Yes	LANXESS Deutschland GmbH

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A6.3.1(01) IIA, VI 6.3.1 also filed: A6.5(02)	[redacted] and [redacted]	1990	*ortho*-Phenylphenol: Palatability/Probe, Four-Week and One-Year Oral Toxicity Studies in Beagle Dogs. Date: 1990-09-24	Dow Chemical Company	K-001024-039	Yes	No	Yes	Dow Chemical Company
A6.3.2(01) IIA, VI 6.3.2	[redacted] and [redacted]	1993	*ortho*-Phenylphenol: 21-Day Repeated Dermal Dose Study of Systemic Toxicity in Fischer 344 Rats. Date: 1993-03-03	Dow Chemical Company	K-001024-056	Yes	No	Yes	Dow Chemical Company
A6.4.1(01) IIA, VI 6.4	[redacted] and [redacted]	1996 a	Technical Grade *ortho*-Phenylphenol: A Special Subchronic Dietary Study to Examine the Mechanism of Urinary Bladder Carcinogenesis in the Male Rat. Date: 1996-11-11	Bayer AG	92-972-MS	No	No	Yes	LANXESS Deutschland GmbH

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A6.5(01) IIA, VI 6.5 also filed: A6.7(01)	[redacted] and [redacted]	1996	Technical Grade *ortho*-Phenylphenol: A Combined Chronic Toxicity / Oncogenicity Testing Study in the Rat. Date: 1996-02-23, Amended: 1999	Bayer AG	92-272-SC	Yes	No	Yes	LANXESS Deutschland GmbH
A6.6.1(01) IIA, VI 6.6.1	San, R.H.C. and Springfield, K.A.	1989	Salmonella/Mammalian-Microsome Plate Incorporation Mutagenicity Assay (Ames Test). Date: 1989-12-22	Bayer AG	C141.501017	Yes	No	Yes	LANXESS Deutschland GmbH
A6.6.1(01)	Ames et al.	1975	Methods for detecting carcinogens and mutagens with salmonella-mammalian-microsome mutagenicity test	--	***Mutation Res.*** **31**, 347-363	--	--	--	--
A6.6.1(01)	Maron & Ames	1983	Revised methods for the salmonella mutagenicity test	--	***Mutation Res.*** **113**, 173-215	--	--	--	--

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A6.6.2(01) IIA, VI 6.6.2	Tayama, S., Kamiya, N. and Nakagawa, Y.	1989	Genotoxic effects of *o*-Phenylphenol metabolites in CHO-K1 cells.	Dept. of Toxicology, Tokyo Metropolitan Research Laboratory of Public Health, Tokyo, Japan	*Mutat. Res.* **223**, pp. 23–33	No	Yes	No	--
A6.6.3(01) IIA, VI 6.6.3	Brendler, S.	1992	Preventol O Extra – Mutagenicity Study for the Detection of Induced Forward Mutations in the CHO-HGPRT Assay In Vitro. Date: 1992-04-09	Bayer AG	21278	Yes	No	Yes	LANXESS Deutschland GmbH
A6.6.5(01) IIA, VI 6.6.5	[redacted]	2000	Preventol O Extra – Comet Assay In Vivo in Mouse Liver and Kidney. Date: 2000-08-08	Bayer AG	PH 30130	Yes	No	Yes	LANXESS Deutschland GmbH
A6.8.1(02) IIA, VI 6.8.1	[redacted] and [redacted]	1991	*ortho*-Phenylphenol (OPP): Gavage Teratology Study in New Zealand White Rabbits. Date: 1991-04-23	Dow Chemical Company	K-001024-045	Yes	No	Yes	Dow Chemical Company

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A6.8.1(01) IIA, VI 6.8.1	Kaneda, M., Teramoto, S., Shingu, A. and Yasuhiko, S.	1978	Teratogenicity and Dominant-Lethal Studies with *o*-Phenylphenol.	Toxicology Division, Institute of Environmental Toxicology, Kodaira, Tokyo, Japan	*J. Pesticide Sci.* **3,** pp. 365-370	No	Yes	No	--
A6.8.2(01) IIA, VI 6.8.2	[redacted] and [redacted]	1995	A Two-Generation Dietary Reproduction Study in Sprague-Dawley Rats Using Technical Grade *ortho*-Phenylphenol. Date: 1995-09-28	Bayer AG	93-672-VX	Yes	No	Yes	LANXESS Deutschland GmbH
A6.8.2(02) IIA, VI 6.8.2	[redacted]	1990	Two-Generation Dietary Reproduction Study in Rats Using *ortho*-Phenylphenol. Date: 1990-09-17 (revised report, original report date: 1989-01-13)		85-671-02	Yes	No	Yes	LANXESS Deutschland GmbH

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A6.10(01)	Fukushima, S., Kurata, Y., Shibata, M., Ikawa, E. and Ito, N.	1983	Promoting Effect of Sodium *o*-Phenylphenate and *o*-Phenylphenol on Two-Stage Urinary Bladder Carcinogenesis.	First Department of Pathology, Nagoya City University Medical School, Nagoya, Japan	*Gann*., **74**, pp. 625-632	No	Yes	No	--
A6.10(02)	Fujii, T., Nakamura, K. and Hiraga, K.	1987	Effects of pH on the Carcinogenicity of *o*-Phenylphenol and Sodium *o*-Phenylphenate in the Rat Urinary Bladder.,	Dept. of Toxicology, Tokyo Metropolitan Research Laboratory of Public Health, Tokyo, Japan	*Fd. Chem. Toxic.* **25**(5), pp. 359-362	No	Yes	No	--

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A6.10(03)	[redacted]	1994	*o*-Phenylphenol – Interactions of *o*-Phenylphenol (OPPBiphenyl-2-ol) and its metabolites with microsomal prostaglandin-H-synthase: possible implications for OPPBiphenyl-2-ol-induced tumour formation in the rat urinary bladder. Date: 1994-01-12	Bayer AG	22788	No	No	Yes	LANXESS Deutschland GmbH
A6.12.1(01) IIA, VI 6.12.1	Heyne, R. and Attig, G.	2004	Occupational Medical Experiences with *o*-Phenylphenol. Date: 2004-12-06	Bayer Industry Services, Leverkusen, Germany	--	No	No	Yes	LANXESS Deutschland GmbH
A6.12.6(01) IIA, VI 6.9.6	Adams, R.M.	1981	Allergic contact dermatitis due to *o*-Phenylphenol.	Palo Alto Medical Clinic, Palo Alto, CA, USA	*Contact Dermatitis* **7**, p. 332	No	Yes	No	--
A6.12.6(02) IIA, VI 6.9.6	van Hecke, E.	1986	Contact sensitivity to *o*-Phenylphenol in a coolant.	Dept. of Dermatology, University Hospital, Gent, Belgium	*Contact Dermatitis* **15**(1)**,** p. 46	No	Yes	No	--

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A6.12.6(03) IIA, VI 6.9.6	Schnuch, A., Geier, J., Uter, W. and Frosch, P.J.	1998	Patch testing with preservatives, antimicrobials and industrial biocides. Results from a multicentre study.	Information Network of Dermatological Clinics in Germany (IVDK)	*Br. J. Dermatology* **138,** pp. 467-476	No	Yes	No	--
A6.12.6(04) IIA, VI 6.9.6	Geier, J., Kleinhans, D. and Peters, K.-P.	1996	Kontaktallergien durch industriell verwendete Biozide – Ergebnisse des Informationsverbunds Dermatologischer Kliniken (IVDK) und der Deutschen Kontaktallergie-gruppe. (Contact Allergy Due to Industrial Biocides– Results of the IVDK and the German Dermatitis Research Group.)	Information Network of Departments of Dermatology in Germany (IVDK)	*Dermatosen / Occup. Environ.* **44,** pp. 154-159	No	Yes	No	--

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
A6.12.6(05) IIA, VI 6.12.6	Brasch, J., Henseler, T. and Frosch, P.	1993	Patch Test Reactions to a Preliminary Preservative Series – A retrospective study based on data collected by the "Information Network of Dermatological Clinics" (IVDK) in Germany.	Information Network of Departments of Dermatology in Germany (IVDK)	*Dermatosen* **41**(2)**,** pp. 71-76	No	Yes	No	--
A6.15(01) IIIA, VI 4	Stroech, K.D.	2013	Residue determination of 4-chloro-3-methylphenol and 2-phenylphenol in edible tissues of 15 broiler chicken that were reared on an area disinfected with the LCB trial product "CMK/OPP 32". date: 2013-01-22	LANXESS Deutschland GmbH,	--	No	No	Yes	LANXESS Deutschland GmbH,
A7.1.1.1.1(01) IIA, VII.7.6.2.1	Reusche, W.	1991	Hydrolysis study of 2-phenylphenol according to OECD guideline 111. Date: 1991-01-02, amended: 2004-12-02	Bayer AG, Leverkusen, Germany	G 89/0056/02 LEV	Yes	No	Yes	Bayer Crop Science AG

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A7.1.1.1.2(01) IIA, VII.7.6.2.2	Heinemann, O.	2005	[Phenyl-UL-^{14}C]-2-phenylphenol: Phototransformation in Water. Date: 2005-03-15.	Bayer CropScience AG, Monheim, Germany	MEF-05/018	Yes	No	Yes	Bayer Crop Science AG
A7.1.1.1.2(02) IIA, VII.7.6.2.2	Wick, L.Y. and Gschwend, P.M.	1998	Source and chemodynamic behaviour of diphenyl sulfone and *ortho*- and *para*-hydroxybiphenyl in a small lake receiving discharges from an adjacent superfund site.	Ralph M. Parsons laboratory, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, USA	*Environ. Sci. Technol*. **32**, pp. 1319-1328.	No	Yes	No	--
A7.1.1.1.2(02)	Haag, W. and Hoigné J.	1986	Singlet oxygen in surface waters .3. Photochemical formation and steady-state concentrations in various types of waters	--	*Environ. Sci. Technol.*, **20**, pp. 341-348	--	Yes	No	--
A7.1.1.1.2(02)	Leifer, A.	1988	The Kinetics of Environmental Aquatic Photochemistry.	--	American Chemical Society, Washington, DC, USA	--	Yes	No	--

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A7.1.1.2.1(01) IIA, VII.7.6.1.1	Gonsior, S.J. and Tryska, T.J.	1997	Evaluation of the Ready Biodegradability of *o*-Phenylphenol. Date: 1997-08-01	Environmental Chemistry Research Laboratory, The Dow Chemical Company, Midland, Michigan	971080	Yes	No	Yes	The DOW Chemical Company
A7.1.1.2.1(02) IIA, VII.7.6.1.1	Kanne, R.	1989 a	Preventol O Extra. Biodegradation. Date: 1989-07-24	Bayer AG, Institut für Umweltanalyse und Bewertungen, Leverkusen, Germany	51A/88/I	Yes	No	Yes	Bayer AG
A7.1.1.2.1(03)	Painter H.A. and King E.F.	1985	Ring test programme 1983-84. Assessment of biodegradability of chemicals in water by manometric respirometry	Ring test, monitored by the Water Research Centre, Elder Way, UK - Stevenage Herts	EUR 9962 EN	No	No	No	Commission of the EC: Environment and Quality of life

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A7.1.1.2.1(04)	Kanne, R.	1989b	Preventol O Extra. Biodegradation in Rhine River Water. Date: 1989-07-24	Bayer AG, Institut für Umweltanalyse und Bewertungen, Leverkusen, Germany	Report-No. 51A/88/II	Yes	No	Yes	Bayer AG
A7.1.1.2.2(01) IIA, VII.7.6.1.2	Wellens, H.	1990	Zur biologischen Abbaubarkeit mono- und disubstituierter Benzolderivate.	Abwasser-biologische Laboratorien der HOECHST AG, Frankfurt, Gedrmany	Z. Wasser-Abwasser-Forsch. 23, 85-98	No	Yes	No	--
A7.1.2.1.1(01) IIIA, XII.2.1	Körner W., Bolz U., Süßmuth W., Hiller G., Schuller W., Hanf V. & Hagenmaier H.	2000	Input/Output Balance of Estrogenic Active compounds in a Major Municipal Sewage Plant in Germany.	Institute of Organic Chemistry, University of Tübingen, Germany	*Chemosphere* **40**, 1131-1142.	No	Yes	No	--
A7.1.2.1.1(01) IIIA, XII.2.1	Bolz, U., Körner, W., Hagenmeier, H.	2000	Development and validation of a GC/MS method for determination of phenolic xenoestrogens in aquatic samples.	Institute of Organic Chemistry, University of Tübingen, Germany	Chemosphere **40**, 929-935.	No	Yes	No	--

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A7.1.2.1.1(02) IIIA, XII.2.1	Ternes, T., Stumpf, M., Schuppert, B., Haberer, K.	1998	Simultaneous Determination of Antiseptics and Acidic Drugs in Sewage and River Water.	ESWE-Institute for Water Research and Water Technology, Wiesbaden, Germany	Vom Wasser, 90, 295-309.	No	Yes	No	--
A7.1.2.1.1(03) IIIA, XII.2.1	Lee, H.-B., Peart, T.E., Svoboda, M.L.	2005	Determination of endocrine-disrupting phenols, acidic pharmaceuticals, and personal-care products in sewage by solid-phase extraction and gas chromatography–mass spectrometry.	Aquatic Ecosystem Protection Research Branch, National Water Research Institute, Environment Canada. Ontario, Canada.	Journal of Chromatography A, 1094, 122–129.	No	Yes	No	--

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A7.1.2.2.2(01) IIIA, XII 2.1	Bruns, E.	2005	Preventol O Extra (*ortho*-Phenylphenol). Summary of screening experiments concerning the behaviour of *ortho*-Phenylphenol (OPP) in a "water-sediment system". Date: 2005-03-29	Bayer Industry Services GmbH & Co. OHG, Leverkusen, Germany	--	Yes	No	Yes	Bayer Crop Science AG
A7.1.3(01) IIA, VII 7.7	Erstling, K.	2001 c	Preventol O Extra in Schuppen – Adsorption/Desorption, during the period June to September 2001. Date: 2001-09-17	Bayer AG, Zentrale Analytik, Leverkusen, Germany	A 0/0068/04 LEV	Yes	No	Yes	LANXESS Deutschland GmbH
A7.2.1(01) IIIA, VII 4, XII 1.1	Fliege, R.	2005	[phenyl-UL-^{14}C]-*ortho*-Phenylphenol: Aerobic soil metabolism in one European soil. Date: 2005-03-23	Bayer CropScience AG, Development, Metabolism / Environmental fate, Germany	MEF-05/072	Yes	No	Yes	Bayer Crop Science AG

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A7.2.2.1(02)	Nitsche, M.	2011	Biodegradation of Preventol® O Extra (2-phenylphenol) in soil under aerobic conditions	Lanxess Deutschland GmbH, Leverkusen, Germany	-	No	No	Yes	Lanxess Deutschland GmbH
A7.2.2.1 (02)	Loehr, Raymond C. and Matthews, John E.	1992	Loss of organic chemicals in soil: Pure compound treatability studies	*Journal of Soil Contamination* **1***(4) 339-360*	--	--	--	--	--
A7.2.3.1(01) IIIA, XII.1.2	Oddy, A. and Jacob, O.	2005	[^{14}C]-2-Phenylphenol: Adsorption to and Desorption from four soils. Date: 2005-03-16	Battelle AgriFood Ltd., Essex, UK	CX/04/019	Yes	No	Yes	LANXESS Deutschland GmbH
A7.3.2 IIIA 12.3	Wasser, C.	2014	Residues of the Combustion of OPP20, Residues in fumes and gases.	Anadiag Laboratories, France 67500 Haguenau	R B4256	No	No	Yes	LANXESS Deutschland GmbH
A7.4.1.1(01) IIA, VII.7.1	[redacted]	1990	Acute Fish Toxicity of Preventol O Extra. Date: 1990-04-10	Bayer AG, Institut für Umweltanalysen und Bewertungen, Leverkusen, Germany	51 A/88 F	Yes	No	Yes	LANXESS Deutschland GmbH

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A7.4.1.1(02)	[redacted]	1991	*o*-Phenylphenol Toxicity to Fish *Chinook salmon* (Oncorhynchus tschawytscha). Date: 1991-10-22	British Columbia Research Corp., Vancouver, Canada	2-11-200-222-91001	No	No	Yes	LANXESS Deutschland GmbH
A7.4.1.2(01) IIA, VII.7.2	[redacted] and [redacted]	1985	Evaluation of the toxicity of Dowicide 1 Antimicrobial, Technical *o*-Phenylphenol to representative aquatic organisms. Date: 1985-12-12	Mammalian and Environmental Toxicology, Health & Environmental Sciences, Midland, Michigan, USA	ES-811	No	No	Yes	Dow Chemical Company
A7.4.1.2(02)	Kühn, R., Pattard, M., Pernak, K.-D. Winter,	1988	Harmful effects of chemicals in the *Daphnia* reproduction test as a basis for assessing their environmental hazard in aquatic systems. March 1988	Institute for Water, Land and Air Hygiene of the Federal German Health Office	10603052	No	Yes	No	--

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A7.4.1.3(01) IIA, VII.7.3	Hicks, S.	2002	*ortho*-Phenylphenol: Growth Inhibition Test with the Green Alga, Selenastrum capricornutum. Date: 2002-03-12	ABC Laboratories, Inc., Missouri, USA	ABC Study No. 46980, Dow Study No. 010167	Yes	No	Yes	Dow Chemical Company
A7.4.1.3(02)	Caspers, N.	1989	Cellular proliferation inhibitory test: *Scenedesmus subspicatus* CHODAT (green alga). Date: 1989-07-04	Bayer AG	No. 51 A/88	No	No	Yes	LANXESS Deutschland GmbH
A7.4.1.4(01) IIA, VII.7.4	Mueller, G.	1990	Preventol O Extra, 2-phenylphenol, Toxicity to Bacteria. Date: 1990-08-08	Bayer AG, Institute of Environmental Analysis, Leverkusen, Germany	51 A/88B	Yes	No	Yes	LANXESS Deutschland GmbH
A7.4.1.4(01) IIA, VII.7.4	Weyers, A.	2006	Preventol O Extra, Toxicity to Bacteria. Re-Evaluation based on Study Report No. 51 A/88 B, corresponding raw data and additional information provided by the sponsor. Date: 2006-09-05	Bayer Industry Services, Leverkusen, Germany	--	Yes	No	Yes	LANXESS Deutschland GmbH

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A7.4.1.4(02)	Klecka, G.M., Landi, L.P. and Rodner, K.M.	1985	Evaluation of the OECD Activated Sludge, Respiration Inhibition Test	--	*Chemosphere* **14**, pp. 1239-1251	No	Yes	No	--
A7.4.2(01) IIA, VII.7.5	Fàbregas, E.	2007	*o*-Phenylphenol - Calculation of the Bioconcentration Factor (BCF). Date: 2007-06-05	Dr. Knoell Consult GmbH, Leverkusen, Germany	Report-No. KC-BCF-08/07	No	No	Yes	LANXESS Deutschland GmbH
A7.4.3.2(01) IIIA, XIII 2.2	[redacted] and [redacted]	2002	Preventol O Extra: Determination of Effects on the Reproduction of Fathead minnow (Pimephales promelas). Date: 2002-03-25	Brixham Environmental Laboratory, AstraZeneca UK Limited, Brixham, UK	BL7213/B	Yes	No	Yes	LANXESS Deutschland GmbH
A7.4.3.3.1(01) IIIA, XIII.2.3	Caspers, N.	1999	Investigation of the Ecological Properties of Preventol O Extra, Test on Bioaccumulation. Date: 1999-05-27	Bayer AG, Leverkusen, Germany	793 A/98	Yes	No	Yes	LANXESS Deutschland GmbH

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A7.4.3.4(01) IIIA, XIII 2.4	Bruns, E.	2001	Preventol O Extra, *Daphnia magna* Reproduction Test. Date: 2001-12-13	Bayer AG, WD-UWS, Institute of Environmental Analysis and Evaluation, Leverkusen	1092 A/01 DL	Yes	No	Yes	LANXESS Deutschland GmbH
7.4.3.4/02	Caspers, N.	1989	Life cycle test with water fleas - *Daphnia magna* - EC_{50} immobilisation and EC_{50} reproduction. ***3.1.1.*** Date: 1989-10-13	Bayer AG	No. 51 A/88	No	No	Yes	LANXESS Deutschland GmbH
A7.4.3.5.1(01) IIIA, XIII 2.4	Egeler, P. and Gilberg, D.	2005	Preventol O Extra: A study on the toxicity to the sediment dweller Chironomus riparius. Date: 2005-02-28	ETC Oekotoxikologie GmbH, Germany	Al1ME	Yes	No	Yes	LANXESS Deutschland GmbH
A7.5.1.1/01	Reis, K-H.	2007	***3.1.2.*** Effects of 2-Phenylphenol (Preventol O Extra) on the Activity of the Soil Microflora in the Laboratory. ***3.1.3.*** Date: 2007-06-21	Institut für Biologische Analytik und Consulting IBACON GmbH, Rossdorf, Germany	35591080	Yes	No	Yes	LANXESS Deutschland GmbH

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A7.5.1.1(02)	Schulz, L.	2012	Effects on the activity of soil microflora (Nitrogen transformation test) Date: 2012-02-10	BioChem agrar, Labor für biologische und chemische Analytik GmbH 04827 Gerichshain, Germany	Project-No. 12 10 48 003 N	No	No	Yes	LANXESS Deutschland GmbH
A7.5.1.2(01) IIIA, XIII 3.2	Moser, Th. and Scheffczyk, A.	2004	Preventol O Extra: Acute toxicity to the earthworm *Eisenia fetida* in an artificial soil test. Date: 2004-12-08	ETC Oekotoxikologie GmbH, Flörsheim, Germany	AI1RA	Yes	No	Yes	LANXESS Deutschland GmbH
A7.5.1.3	Bützler, R., Meinerling, M.	2008	***3.1.4.*** Effects of 2-Phenylphenol (Preventol O Extra) on Terrestrial (Non-Target) Plants: Seedling Emergence and Seedling Growth Test. ***3.1.5.*** Date: 2008-10-17	IBACON GmbH, Rossdorf, Germany,	Report No. 35594084	Yes	No	Yes	LANXESS Deutschland GmbH

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A7.5.3.1.1(01) IIIA, XIII 1.1	[redacted]	1986a	*ortho*-Phenylphenol Technical: An Acute Oral Toxicity Study with the Mallard. Date: 1986-06-06	Wildlife International Ltd., St. Michaels, Maryland, USA	ES-874 (103-248)	Yes	No	Yes	Dow Chemical Company
A7.5.3.1.2(01) IIIA, XIII 1.2	[redacted]	1986b	*ortho*-Phenylphenol Technical: A Dietary LC_{50} Study with the Bobwhite. Date: 1986-06-06	Wildlife International Ltd., St. Michaels, Maryland, USA	ES-873 (103-246)	Yes	No	Yes	Dow Chemical Company
A7.5.3.1.2(02) IIIA, XIII 1.2	[redacted]	1986c	*ortho*-Phenylphenol Technical: A Dietary LC_{50} Study with the Mallard. Date: 1986-06-06	Wildlife International Ltd., St. Michaels, Maryland, USA	ES-875 (103-247)	Yes	No	Yes	Dow Chemical Company
A7.5.5.1(01) IIIA, 13.3	Fàbregas, E.	2007	*o*-Phenylphenol - Calculation of the Bioconcentration Factor in Earthworms (BCFearthworm). Date: 2007-06-05	Dr. Knoell Consult GmbH, Leverkusen, Germany	Report-No. KC-BCF-09/07	No	No	Yes	LANXESS Deutschland GmbH

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A8.1(01) IIA, VIII 8.1 also filed: A8.2(01) also filed: A8.3(01) also filed: A8.4(01) also filed: A8.5(01)	Anonymous	2004	Safety Data Sheet Preventol O Extra. Date: 2004-03-10	LANXESS Deutschland GmbH, Leverkusen, Germany	011472/23	No	No	--	LANXESS Deutschland GmbH

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B2.2(01) IIB, I 2.2	Bayer MaterialScience AG (Ed.)	2011 a	Safety Data Sheet CAUSTIC SODA SOLUTION (50%). Date: 2011-11-04 **CONFIDENTIAL**	Bayer MaterialScience AG, Leverkusen, Germany	Version 3.1	No	No	No	Bayer MaterialScience AG
B2.2(02) IIB, I 2.2	Bayer MaterialScience AG (Ed.)	2011 b	Technical information Caustic Soda Solution 50%. Date: 2011-03-11 **CONFIDENTIAL**	Bayer MaterialScience AG, Leverkusen, Germany	Specification No: 05452627-01-11	No	No	No	Bayer MaterialScience AG
B2.3(01) IIB, I 2.3 also filed B3.1(01)	Stroech, K.	2006	*o*-Phenylphenol / Appearance. Date: 2006-04-11	LANXESS Deutschland GmbH, Leverkusen, Germany	--	No	No	Yes	LANXESS Deutschland GmbH
B3.1(01)	Stroech, K.D.	2012 a	Preventol® ON Extra Preservative Solution / Appearance Properties. Date: 2012-01-31	LANXESS Deutschland GmbH, Leverkusen, Germany	212951ni-sxx	No	No	Yes	LANXESS Deutschland GmbH

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B3.2(01) IIB, III 3.2	Stroech, K.	2004 a	*o*-Phenylphenol / Explosive properties. Date: 2004-07-29	Bayer Chemicals AG, Leverkusen, Germany	--	No	No	Yes	LANXESS Deutschland GmbH
B3.2(01)	Stroech, K.D.	2012 b	Preventol® ON Extra Preservative Solution / Explosive Properties. Date: 2012-01-31	LANXESS Deutschland GmbH, Leverkusen, Germany	212954ni-sxx	No	No	Yes	LANXESS Deutschland GmbH
B3.3(01) IIB, III 3.3	Stroech, K.	2004 b	*o*-Phenylphenol / Oxidising properties. Date: 2004-07-29	Bayer Chemicals AG, Leverkusen, Germany	--	No	No	Yes	LANXESS Deutschland GmbH
B3.3(01)	Stroech, K.D.	2012 c	Preventol® ON Extra Preservative Solution / Oxidising Properties. Date: 2012-01-31	LANXESS Deutschland GmbH, Leverkusen, Germany	212955ni-sx	No	No	Yes	LANXESS Deutschland GmbH
B3.4(01) IIB, III 3.4	Heinz, U.	2004	Determination of safety relevant data of Preventol O Extra. Date: 2004-07-12 Amended: 2005-01-14	Bayer Industry Services, Leverkusen, Germany	04/00223	Yes	No	Yes	LANXESS Deutschland GmbH

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B3.4(01)	Stroech, K.D.	2012 d	Preventol® ON Extra Preservative Solution / Flammability or Spontaneous Ignition Properties. Date: 2012-01-31	LANXESS Deutschland GmbH, Leverkusen, Germany	212952ni-sxx	No	No	Yes	LANXESS Deutschland GmbH
B3 IIB, III 3.4	Heinz, U.	2004	Determination of safety relevant data of Preventol O Extra. Date: 2004-07-12 Amended: 2005-01-14	Bayer Industry Services, Leverkusen, Germany	04/00223	Yes	No	Yes	LANXESS Deutschland GmbH
B3.4(01) B3.6(01) B3.10(01)	Krasemann, R.	2006	Safety-related Data / Product description of Preventol ON Extra Preservative Solution. Date: 2006-10-27	Bayer Industry Services GmbH & Co. OHG, Leverkusen, Germany	2006/01781	No	No	Yes	LANXESS Deutschland GmbH
B3.5(01) IIB, III 3.4	Erstling, K.	2007	Determination of acidity/alkalinity	Bayer Industry Services, Leverkusen, Germany	2007/0045/02	Yes	No	Yes	LANXESS Deutschland GmbH

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
B3.5(01)	Nitsche, M.	2012 a	Preventol® ON Extra Preservative Solution Determination of pH - Value. Date: 2012-04-16	LANXESS Deutschland GmbH, Leverkusen, Germany	None	No	No	Yes	LANXESS Deutschland GmbH
B3.5(02)	Nitsche, M.	2012 b	Determination of the Alkalinity of Preventol® ON Extra Preservative Solution. Date: 2012-04-13	LANXESS Deutschland GmbH, Leverkusen, Germany	None	No	No	Yes	LANXESS Deutschland GmbH
B3.6(01) IIB, III 3.6	Erstling, K.	2001	Physicochemical properties. Date: 2001-09-13 Amended: 2004-12-02, 2006-03-02 and 2006-04-24	Bayer AG, Leverkusen, Germany	A 00/0068/01 LEV	Yes	No	Yes	LANXESS Deutschland GmbH

(Sub)Section / Annex point	Authors (s)	Year	Title	Testing Company	Report No.	GLP Study (Yes/No)	Published (Yes/No)	Data Protection Claimed (Yes/No)	Data Owner
B3.7(01) IIB, III 3.7	European Commission (Ed.)	2006	Content of the product dossier accompanying the active substance for Annex I inclusion. Date: 2006-09-14	European Commission, Directorate-General-JRC, Institute for Health and Consumer Protection, Unit: Toxicology and Chemical Substances, European Chemicals Bureau	--	No	Yes	No	European Commission, European Chemicals Bureau
B3.7(01)	Nitsche, M.	2012 c	Storage Stability of the Formulation Preventol ON Extra Preservative Solution at Accelerated Temperature 0f 40 °C. Date: 2012-05-08	LANXESS Deutschland GmbH, Leverkusen, Germany	None	No	No	Yes	LANXESS Deutschland GmbH

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B3.7(02)	Nitsche, M.	2012 d	Storage Stability at 0 °C of the Formulation Preventol ON Extra Preservative Solution. Date: 2012-02-17	LANXESS Deutschland GmbH, Leverkusen, Germany	None	No	No	Yes	LANXESS Deutschland GmbH
B3.7(03)	Nitsche, M.	2012 e	Storage Stability of the Formulation Preventol ON Extra Preservative Solution at Ambient Temperature. (6 months interim report) Date: 2012-08-03	LANXESS Deutschland GmbH, Leverkusen, Germany	None	No	No	Yes	LANXESS Deutschland GmbH
B3.8(01) IIB, III 3.8	Erstling, K.	2007	Physicochemical properties of Preventol O Extra	Bayer Industry Services, Leverkusen, Germany	2007/0045/02	Yes	No	Yes	LANXESS Deutschland GmbH
B3.10(01) –	Olf, G.	2004	Surface tension of Preventol O Extra. Date: 2004-09-16	Bayer Technology Services, Leverkusen, Germany	04006/03	Yes	No	Yes	LANXESS Deutschland GmbH

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B3.10(01)	Keldenich, H.-P. and Kokott, H.	2011	Determination of Surface Tension of Preventol ON Extra preservative solution. Date: 2011-02-28	Bayer Technology Services GmbH, Operation Support & Safety, Process and Plant Safety Laboratory, Leverkusen, Germany	Study-No.: 2011/00296e	No	No	Yes	LANXESS Deutschland GmbH
B4.1(01) IIA, IV 4.1	Feldhues, E.	2005 a	Validation of analytical methods for the determination of main and minor components in Preventol O Extra. Date: 2005-02-04 Amended: 2006-04-24	Bayer Industry Services GmbH & Co. OHG, BIS-SUA-Analytics, Leverkusen, Germany	A 02/0162/08 LEV	Yes	No	Yes	LANXESS Deutschland GmbH

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B4.1(01)	Nitsche, M.	2012f	Validation of the Test Method AFAM 2301-0272501-99E for Determination of Content of *o*-Phenylphenol in Preventol® ON Extra Preservative Solution. Date: 2012-04-16	LANXESS Deutschland GmbH, Leverkusen, Germany	None	No	No	Yes	LANXESS Deutschland GmbH
B5.8 IIB, V5.8	Russell, A.D., Hugo, W.B. and Ayliffe, G.A.J.	1990	Principles and practice of disinfection, preservation and sterilisation.	---	Second Edition, Blackwell Scientific Public., London (pages 201 and 204).	No	Yes	No	--
B5.10(01) IIB, V 5.10	Groetsch, W. and Nothhelfer, B.	2000	SF Preventol OPP. Determination of the bacteriostatic and fungistatic efficacy according to the DGHM-guideline (I/2.1). Date: 2000-06-27	Labor L+S, Bad-Bocklet-Großenbrach, Germany.	Report No. 01020970	No	No	Yes	LANXESS Deutschland GmbH

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B5.10(02) IIB, V 5.10	Wachtler, P.	2002	Preventol Preservatives. Report on Preservation Test. Efficacy of Preventol OF 45 in a $CaCO_3$ slurry.	Bayer Chemicals, BCH-MPP-TM-IPC, Building R54, Krefeld, Germany Date: 2002-08-05	--	No	No	Yes	LANXESS Deutschland GmbH
B5.10(03) IIB, V5.10	Herbertz, T.	2012	Efficacy study submitted for the registration of Preventol® ON Extra Preservative Solution. The results support the antimicrobial efficacy for Product-type 07 according to the BPD 98/8/EC. Date: 2012-03-08	Lanxess Deutschland GmbH, Leverkusen, Germany	---	No	No	Yes	LANXESS Deutschland GmbH
B5.10(04) IIB, V5.10	Herbertz, T.	2014	Efficacy of Preventol O Extra in a liquid detergent in-can preservative test	Lanxess Deutschland GmbH, Leverkusen, Germany	-	-	No	Yes	LANXESS Deutschland GmbH

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B6.1.1 IIB, VI 6.1.1	[redacted]	1998 a	Single Dose Oral Toxicity in Rats/LD 50 in Rats. Date: 1998-12-01	MB Research Laboratories, Spinnerstown, PA, USA	Project No.: MB 98-7078.01	Yes	No	Yes	LANXESS Deutschland GmbH
B6.1.2 IIB, VI 6.1.2	[redacted]	1998 b	Acute Dermal Toxicity in Rabbits/LD 50 in Rabbits. Date: 1998-11-24	MB Research Laboratories, Spinnerstown, PA, USA	Project No.: MB 98-7078.02	Yes	No	Yes	LANXESS Deutschland GmbH
B6.2(1) IIB, VI 6.2	[redacted]	1998 c	Primary Dermal Irritation in Rabbits. Date: 1998-11-24	MB Research Laboratories, Spinnerstown, PA, USA	Project No.: MB 98-7078.03	Yes	No	Yes	LANXESS Deutschland GmbH
B6.2(2) IIB, VI 6.2	[redacted]	1998 d	Primary Eye Irritation/Corrosion in Rabbits. Date: 1998-12-01	MB Research Laboratories, Spinnerstown, PA, USA	Project No.: MB 98-7078.04	Yes	No	Yes	LANXESS Deutschland GmbH
B6.3 IIB, VI 6.3	[redacted]	1994	Dowicide™ A Antimicrobial: Dermal Sensitization Potential in the Hartley Albino Guinea Pig. Date: 1994-07-29	The Toxicology Research Laboratory, Health and Environmental Science, Dow Chemical Company, Midland, MI, USA	Report No.: K-001025-014E	Yes	No	Yes	Dow Chemical Company

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B6.4 IIB, VI 6.4	Selim, S.	1996	A Single Open Dose Label Study to Investigate the Absorption and Excretion of $^{14}C/^{13}C$-Labeled *ortho*-Phenylphenol Formulation after Dermal Application to Healthy Volunteers. Date: 1996-09-19	Bayer AG	P0995002	Yes (GCP)	No	Yes	LANXESS Deutschland GmbH
B6.6 IIB, VI 6.6	Oschwald, D. & Zürcher, W.	2003	Raumluftmessung im Werk Gummern vom 07. - 09. Januar 2003 [Indoor Air Measure-ments in the Gummern Plant between 7th and 9th January, 2003]. Date: 2003-01-16	Omya AG, Analytical Laboratory, Oftringen, Switzerland	58005.03	No	No	Yes	LANXESS Deutschland GmbH

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B6.6 IIB, VI 6.6	Wachtler, P. & Kretschmer, F.	2002	Preventol VP SP 80005 - Stationäre and personen-bezogene Messungen im Bereich der Bahn-verladung (Gleis 3+5) Firma Omya AG in Gummern (Österreich) [Preventol VP SP 80005 - Stationary and Personal Measurements in the Train Charging Area of Omya AG in Gummern (Austria)]. Date: 2002-06-18	Bayer AG Werk Uerdingen, Krefeld, Germany	--	No	No	Yes	LANXESS Deutschland GmbH
B8(01) IIB, VIII 8	LANXESS Deutschland GmbH (Ed.)	No data	Safety Data Sheet PREVENTOL ON EXTRA PRESERVATIVE SOLUTION.	LANXESS Deutschland GmbH, Leverkusen, Germany	81238457C	No	No	No	LANXESS Deutschland GmbH