CEPE is raising attention to the importance of DCOIT for the preservation of paints and wood coatings

Draft v 1

Our call for attention

The proposed 10 ppm limit for the skin sensitizing property is much lower than the level required to efficiently preserve paints and coatings against fungal and algal development. Such threshold would induce a ban of our products for consumers under the Biocide Product Regulation. The toolbox gets evermore emptier and the successful preservation of products is compromised. Although such consideration is in principle not relevant for a hazard based classification process it helps regulators understand the importance of the subject and allows for a proper discussion.

Who are we?

CEPE is the European Council of Paint, Printing Ink and Artists' Colours. It represents around 800 companies, with a majority of SMEs, a turnover of about €16 billion and over 100,000 in direct employment. An estimated 1 million workers are involved with the application of paint/coatings/inks.

What is DCOIT

DCOIT (4,5-dichloro-2-octyl-2H-isothiazol-3-one[1]) is a substance used to preserve the dry film, i.e. after the coating has dried, against a number of microbial attacks. It is used in paint and wood preservatives. It is currently present in many products and countries. In Scandinavian for instance, a large part of houses are wooden based and most consumer re-paint their house by themselves. These consumers may not in the future have available effective products.

Justification of using dry-film preservation

It is necessary to control the growth of fungi and algae on building facades and other substrates including wood. Besides aesthetic considerations, the presence of microorganisms on the surface of coatings will increase the moisture content which will in itself be the cause of subsequent damage of the coating and the substrate under it.

What is the paint users' exposure to DCOIT from our products?

DCOIT is used at levels <0.1% and consumer paints are used infrequently.

What are the consequences of the 10 ppm SCL limit?

DCOIT is not effective at 10 ppm. A SCL of 10 ppm as threshold for induction means that any use of DCOIT leads to the classification of our products as skin sensitizers. Based on previous decision the BPR Authorities consider that products (such as paint) classified as such cannot be sold to the general public (consumers) as it cannot be assumed that they would wear gloves. This is therefore a *de facto* ban of DCOIT.

[1] CAS number 64359-81-5

Is DCOIT so crucial for dry-film preservation?

We would like to attract your attention to the increasingly concerning situation that we are facing with the review of biocide active substances under the BPR and their (re-)classification. The BPR review of existing substances, which is ongoing for about 15 years, is evaluating substances in isolation and not taking a holistic approach to the issue of dry-film preservation. There are only 4-5 effective dry-film preservation substances left. A variety of substances with broad spectrum of action allowed at effective concentrations is necessary to avoid the development of microbial tolerance.

No socio-economic analysis is conducted in the decision making process of the BPR.

In the next section the reader can find an explanation of the problem that our industry is facing with dry-film preservation.

The need for a holistic approach on dry-film preservatives

The benefits of dry-film preservatives and the consequences of losing effective protection on the sustainable use of paint

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Introduction

CEPE members are users of dry-film preservative products (PT7) and have been approached by the biocide suppliers who explained the increasing difficulty to pass the environmental risk assessment due to over conservatism in the current approaches. According to their evaluation if the current methodologies are applied, most of the effective actives will not pass the risk assessment for the environment. As a consequence the number of allowed actives for PT7 will dramatically reduce, which leads to ecological and economic consequences.

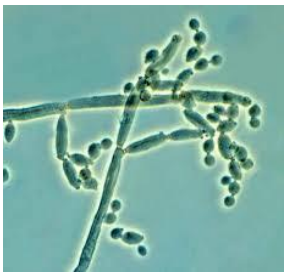
This paper aims at helping Competent Authorities in understanding the benefits of these PT7 biocidal products to the society and to our industry as part of the sustainable use of paints. CEPE is calling for a pragmatic approach to the problem when using guidance on risk assessment and for the consideration of all dry-film biocide actives substances in a holistic approach leading to a balanced view on the risks and benefits of the use of these biocides in certain paints.

Why using dry-film preservatives?

Fungi and algae are abundantly available in air both in indoor and outdoor environment. The numbers of these spores vary during the season where autumn usually is the most critical period. But also different types of constructions, climate differences between the different countries and exposure will have an impact on the risk of fungi and algae growth.

The fungi that will attack dry coating films belong to the group named Ascomycetes[2]. These fungi consists of branches i.e. the so called hyphae's where spores are attached. It is the spores that spreads in the air and will land on surfaces where after growth will be initiated. As these hyphae are coloured attacks of these fungi will usually leave discolorations on the coating film with black, blue or greenish colours. The spores onto a surface will adhere using compounds similar to glue and the hyphae's are well protected with wax leading to the necessity to use chemicals for cleaning purposes.

[2] Fungi types : Aspergillus, Cladosporium, Penicilium, Aureobasidium



The fungi will need only limited amounts of oxygen, water and nutrient for their ability to grow. Due to these facts growth is observed on different surfaces as Teflon, very smooth and glossy films and also films where water repellence is present. Consequently, attacks occur on nearly all types of surfaces if not protected properly (such as coatings like high gloss joinery enamels, silicone paints…).

Damages

Besides aesthetic considerations, the presence of microorganisms on the surface of coatings will increase the moisture content which will in itself be the cause of subsequent damage of the coating and the substrate under it.

Alternatives

Dry-film preservation is mainly used in organic resin based coatings. Silicate and lime paints are used for masonry without the use of film preservation due to the high pH and instability of most biocide actives, however they are as well sensitive to microbes. These types of paints have limited use due to requirements for the substrate and limited opportunities for maintenance. It should also be noted that this technology is not suitable for wood.

Self-polishing paint used in the anti-fouling industry cannot be used for facades as they require movement to remove the adhering organisms.

Available biocide active substances

One cannot simply believe that all the substances supported under the review programme are used in our business. There may be several reasons that suppliers have supported them, one of which being that the main driver was in another application with limited additional support for PT7. We have identified in the table in Annex 1 among the substances supported under the BPR those that are effectively used and we added justifications based on our knowledge.

This overview shows that there is only a limited number of key substances that are usable in coatings, namely:

- Fungicides: DCOIT, IPBC, OIT, Zinc Pyrithion
- Algaecides : Diuron, Isoproturon, Terbutryn, (DCOIT)

There is less than a handful of effective and usable substances left to control fungi or algae, respectively. New substances for use as dry-film preservatives are not observed and are not expected due to the high costs and uncertainties inherent to the BPR. Since the start of the EU biocide legislation we have seen a reduction of biocide suppliers.

Impact of the loss of effective dry-film preservation

Without dry-film preservation the paint film is lacking the protection against micro-organisms which use all surfaces to grow. Within a period of 6-24 months the facades across Europe will start to look dirty. Some may conclude that the problem is only aesthetic and that it is preferable to stop PT7 biocides and leave the surfaces as such. However most house owners will start washing their walls and re-paint more often. It is therefore useful to understand the consequences in terms of water and energy consumption, as well as costs and waste generation.

In order to estimate the impact of the disappearance of dry-film preservatives we have estimated the total outdoor surface painted annually in Europe. Based on internal statistics there is just above 1 million tons of outdoor coating sold/year, which equals to around 0.77 billion litres. Taking a spreading rate of 6 m2/L and 2 layers it can be estimated that the total outdoor surface painted annually is 2.3 billion m2, rounded down to 2 billion m2 to take into account some unused paint and to facilitate the calculation.

From this a rough estimate of the total area of painted surface (with a re-painting interval of 10 years) is 20 billion m2.

WASHING WALLS

Fungi and algae can be washed with water using high pressure spray. Using detergents or biocide solutions helps the removal of the microorganisms but not without other environmental considerations that we will not cover here. Washing with steam/hot water is not practical either as the outdoor paints are not designed to tolerate such physical stress. The durability of the paint film under normal outdoor condition has priority during the design phase of the product. Resistance against normal conditions as well as hot steam cleaning are technically contradictory requirements.

When washing the walls with water only, the surfaces do not become microbiologically clean. Even if the visible fungi and algae can be removed the microbial contamination is still present. Washing does not give any disinfection and / or long-term preservation and thus the operation needs to be repeated on a regular basis because the organisms continue to grow.

The frequency of washing depends on weather conditions (such as temperature and humidity). In practice in humid areas the surfaces have been covered with visible fungi / algae growth within months meaning that the washing should be repeated at least every year. Under dry conditions the time interval may be longer.

Hence washing is only a temporary solution. It requires significant resources and also is very expensive to be organized. Using high pressure equipment for washing the surfaces requires good working practices and skilled personnel. Otherwise there is a high probability that the construction

will be damaged because the outdoor surfaces are never tight enough to prevent the water to penetrate into the construction. If e.g. the insulation materials are soaked with water, the materials can be damaged and there can even start microbial growth inside the structure.

The water consumption for washing one m2 is estimated to be 30 l/m2 (10L/min x 3 min/m2). Therefore, it can be estimated that washing all the surfaces once a year would require approximately 600 billion litres of water.

Based on the typical energy consumption of pressure washer (2 kW/h) and the time needed for washing the surfaces (20 m2/h), the extra energy needed for washing the surfaces can be estimated to be approximately 2 billions kWh/year. The production of this energy (1L oil = 12 kWh) would require about 166 million litres of oil and would emit 400 000 tons of CO2 to the air every year (2.3 Kg CO2/L fuel).

The labour cost for washing by professionals could be calculated assuming a cost of 8 euros / sqm (worker, safety precautions, person lift, water, etc) we would then have 160 billion euros/year.

We do recognize that it is a worst case estimate to consider that all painted surfaces would be washed every year. Our experience is that some unprotected paint may not be contaminated rapidly but other protected films could be attacked more rapidly because they are located in adverse environment (presence of vegetation, humidity, North orientation etc.). This estimation only aims at highlighting some possible adverse consequences of the disappearance of effective dry-film preservatives and to estimate an order of magnitude of the impact.

RE-PAINTING

The service life of the paint film can be expected to be divided by two due to extensive washing, e.g. if the expected service life was 10 years without washing, it is quite realistic to expect a need for repainting already after 5 years. This doubles the cost of paint estimated to be 5 billions/year.

In addition the CO2 emission due to paint manufacturing would double and would generate an additional 1.6 million tons CO2/year.

Conclusion

Fungi and algae develop on façade coatings. There is a handful of effective fungicides and algaecides still available. The BPR is reviewing these dry-film preservative substances and we are concerned that negative approval decisions would be made. The loss of dry-film preservatives would lead to a rapid aesthetic impact of outdoor facades in Europe. As a consequence people would have to clean them and re-paint more often. This would have significant ecological and economic impacts. The paint industry would be happy to double its sales, but in reality this would not take place: claims will be made and overall the building facades in Europe would look dirtier and will deteriorate faster. It would also be against sustainable development, and biocides form an integral part of this positive trend. Therefore we believe that decisions on the biocides actives in the BPR review programme should be made using a holistic approach to dry-film preservation with critical evaluation of the impact of their disappearance.

Annex 1

Substance:	CAS number:	Comment
olan-2-yl]methyl]-1H-1,2,4-triazole (Propiconazole)	60207-90-1	Limited use as limited function against surface mould (this active has been around for decades and is used as PT8, but not in PT7 - the main issue is limited efficacy)
2-butyl-benzo[d]isothiazol-3-one (BBIT)	876403	Not used, PT6 substance
2-octyl-2H-isothiazol-3-one (OIT)	26530-20-1	In use, key substance; however highly susceptible to leaching so needs encapsulation. Also indoor use.
2-thiazol-4-yl-1H-benzoimidazole (Thiabendazole)	148-79-8	Limited use, may have discoloration problems
3-(4-isopropylphenyl)-1,1-dimethylurea/ Isoproturon	34123-59-6	In use
3-iodo-2-propynylbutylcarbamate (IPBC)	55406-53-6	In use, key substance; unstable in SB alkyd system
4,5-Dichloro-2-octylisothiazol-3(2H)-one (4,5-Dichloro-2-octyl-2H-isothiazol-3-one (DCOIT))	64359-81-5	In use, key substance but pressure on labelling already affecting retail sales
Azoxystrobin	131860-33-8	Not used
Biphenyl-2-ol	90-43-7	Not used, not a PT7 substance
Carbendazim	10605-21-7	In use but dropped significantly due to classification; exclusion criteria for CMR 1
Dichloro-N-[(dimethylamino)sulphonyl] f luoro-N-(ptolyl)methanesulphenamide (Tolylf luanid)	731-27-1	No outdoor use and not for water borne anyway
Dimethyloctadecyl[3-(trimethoxysilyl)propyl]ammonium chloride	27668-52-6	Cannot be used in paints as reacts with water and binder
Diuron	330-54-1	In use, key substance
Fludioxonil	131341-86-1	Not used
N-(Dichlorofluoromethylthio)-N',N'-dimethyl-N-phenylsulfamide (Dichlofluanid)	1085-98-9	No outdoor use and not for water borne anyway
N-(trichloromethylthio)phthalimide (Folpet)	133-07-3	Cannot be used in water borne paints as hydrolysis. In solvent born paints shows severe retardation of drying.
p-[(diiodomethyl)sulphonyl]toluene	20018-09-1	Not used, causes yellowing
Pyridine-2-thiol 1-oxide, sodium salt (Sodium pyrithione)	3811-73-2	This salt is not used in PT7 but in PT13
Pyrithione zinc (Zinc pyrithione)	13463-41-7	In use, key substance
Reaction mass of titanium dioxide and silver chloride		Not used This aims at PT2 indoor but the target is bacteria and not fungi or algae

Silver chloride	7783-90-6	Not used This aims at PT2 indoor but the target is bacteria and not fungi or algae
Silver copper zeolite	130328-19-7	Not used This aims at PT2 indoor but the target is bacteria and not fungi or algae
Silver nitrate	7761-88-8	Not used This aims at PT2 indoor but the target is bacteria and not fungi or algae
Silver phosphate glass	308069-39-8	Not used This aims at PT2 indoor but the target is bacteria and not fungi or algae
Silver sodium hydrogen zirconium phosphate	265647-11-8	Not used This aims at PT2 indoor but the target is bacteria and not fungi or algae
Silver zeolite		Not used This aims at PT2 indoor but the target is bacteria and not fungi or algae
Silver zinc zeolite	130328-20-0	Not used This aims at PT2 indoor but the target is bacteria and not fungi or algae
Sodium 2-biphenylate	132-27-4	Not used, not a PT7 substance
tebuconazole	107534-96-3	Not used, not a PT7 substance
Terbutryn	886-50-0	In use, important substance