Journal

13 2020
Information from
Worlée-Chemie GmbH


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Webinar@ Worlée-Chemie
Everything revolved around wood coatings in our web seminars.

What's news in Worlée's product family?
Learn more about exciting developments in the world of binders and adhesion promoters.

Worlée wins EcoVadis Platinum Medal
We did it again this year!

Bruno Bock
Thiocure®: low viscosity VOC-free polythiol compounds

Dear customers, partners and friends,

a lot has changed for all of us in times of the corona crisis. New ways had to be discovered to continue working and not miss planned events. "We do it online" is the new motto. That's why we organised our Worlée Coating Seminar as a prelude to our planned web seminar series as an online event. And what can one say – even in difficult times we don't give up. We continue to work diligently on product developments and do our best to do something good for the climate.

We have summarised everything for you in the 13th issue of our Worlée Journal to inform you about what has happened in the fourth quarter of 2020.
Here's to good teamwork in times of pandemic and in the New Year!
Stay healthy!

Yours sincerely

Joachim Freude,
General Manager

Webinar@Worlée-Chemie

In this year's **Worlée Coating Seminar,** everything revolved around wood coatings. Because as a natural material with excellent properties, wood offers a wide range of possible applications. Depending on current trends, wood surfaces can be refined with modern wood coatings and provide a natural look, elegant colouring, striking grain or noble shining. At the same time, wood coatings have to protect against chemical and physical influences, fulfil a variety of requirements and offer further functionalities. Expected are innovative, low-emission lacquers with outstanding properties.

The seminar was originally scheduled as face-to-face event in March 2020. Due to the current situation, we had to reschedule the event and hosted it as a web seminar on 15th and 16th September. "It was always clear that we didn't want to miss the Worlée Coating Seminar. Special times require new approaches", says Dr. Thorsten Adebahr, Head of Traded Products.

Therefore, together with our partners Dow, Synthomer and Vencorex, we presented new findings on binders and additives for wood coatings, as well as sustainable wood finishing products, in seven exciting web presentations.

Dr. Adebahr led the participants through the various presentations as moderator. During each presentation, participants had the opportunity to ask questions via the chat function. The questions were answered in a short Q&A session after each presentation. "We are very pleased that our web presentations had many interested participants. Our expectations were truly exceeded. The two seminar days were a lot of fun and also a complete success for our speakers and the organisation team", said Adebahr.

You are interested in wood coatings but could not attend our Worlée Coating Web Seminar? Then have a look at our web seminar channel:
https://www.gotostage.com/channel/worlee-chemie.
There, four of the five presentations are available for you in German as video.

Dr. Thorsten Adebahr,
Head of Traded Products
and moderator

Moderne Alkydemulsionen für nachhaltige Holzbeschichtungen
Caroline Matthiesen,
Worlée-Chemie GmbH

Bindemittel auf Basis nachwachsender Rohstoffe
Matthias Körber,
Worlée-Chemie GmbH

WorléePur Si – Silanfunktionelle Polyurethan-Urea Bindemittel – Die Zukunft für Zaun, Parkett und Tisch?
Lars Ossenschmidt,
Worlée-Chemie GmbH

Transparentes Brandschutzsystem für Holz auf Silikatbasis
Nicole Ahlgrimm,
Worlée-Chemie GmbH

Si solution – broad spectrum of benefits for wood coating
Michael Hrebicik,
Dow Europe GmbH

Marc Cornick,
Vencorex France

Thomas Bernhofer,
Synthomer

WorléePur Si

the future for furniture, parquet and vehicles?

The silane-functional polyurethane-urea resins of the WorléePur Si series have established themselves as binder technology for various coating systems. Starting from the polyol used, which forms the basis of the technology, it is possible to develop binders for both industrial and handicraft applications.

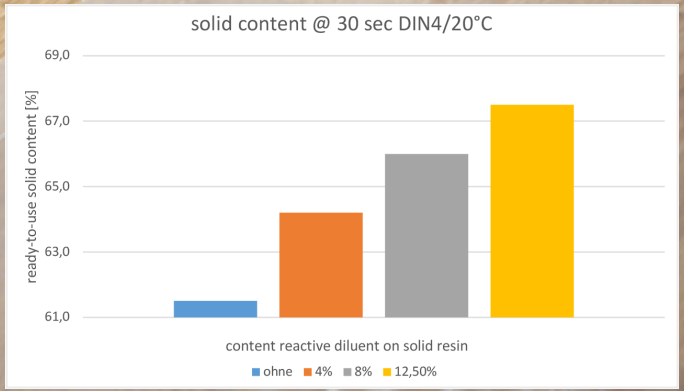
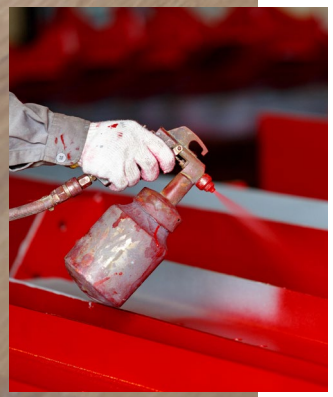


Figure 1: Content reactive diluent on solid resin



Amount reactive diluent	without	4%	8%	12.5%
Dust free	5 min	5 min	6 min	7 min
Tack free	90 min	90 min	90 min	90 min
Drying stage 6	90 min	115 min	115 min	115 min

Table 1: Drying behaviour of a 100 µm wet film

The products are composed of polyurethane and urea blocks, which provide tough, elastic, hard and resilient paint films. The ethoxysilane groups crosslink with the help of air humidity at room temperature and additionally strengthen the polymer by the inorganic silicon. In any case, products are obtained which ensure fast drying and equally fast cross-linking in coating systems with very long processing times. Especially the fast cross-linking ensures an early mechanical and chemical resistance, which significantly accelerates the further handling of the coated surfaces.

The use of suitable reactive diluents allows the formulation of very high solids coating systems. Suitable types are, for example, tetraethylorthosilicate and isobutyltriethoxysilane. Both reactive diluents are compatible with the different products of the WorléePur Si series and can cross-link with them during drying. The ethoxysilane groups contained in these diluents split ethanol during hydrolysis. However, these types are very low viscous liquids and therefore reduce the viscosity of the coatings when used. At the same time, they increase the non-volatile content of the coating systems through possible cross-linking with the binders used.

Fig. 1 shows the influence of tetraethylorthosilicate on the ready-to-use solid content of an industrial topcoat with the same processing viscosity.

On the one hand, even small amounts of tetraethylorthosilicate increase the solid content noticeably and increase significantly with growing quantities.

On the other hand, the use of the above-mentioned reactive diluent has no significant effect on the drying properties of the coatings. As shown in Tab. 1, the use of a reactive diluent achieves drying stage 6 later, but basically still very early.

Reactive diluents can be selected according to their intended use. In fast-drying coating systems for e.g. furniture or vehicle coatings, the tetraethylorthosilicate is more suitable. The four ethoxysilane groups contained lead to fast drying and also improve the spatial cross-linking.

In handicraft lacquer systems, e.g. parquet lacquers and oils, a longer open time and thus improved application with brush and roller is more important. Here the use of isobutyltriethoxysilane is recommended. The reactive diluent contains three ethoxysilane groups and one isobutyl rest, which improves the compatibility with dearomatised solvents and delays the reaction with the resin.

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News from the product family of adhesion promoters: WorléeAdd VP 4890

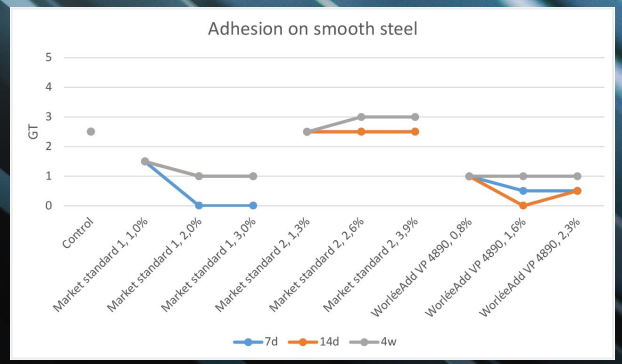

Diagram 1:
Adhesion of various adhesion promoters on smooth steel.

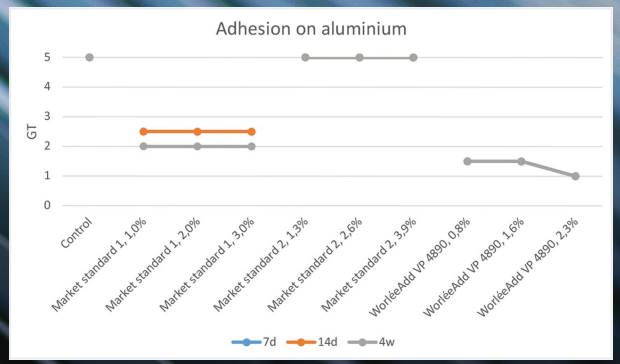

Diagram 2:
Adhesion of various adhesion promoters on aluminium.

In industrial applications on metal, adhesion properties play a special role. In order to achieve the desired adhesion, special additives, so-called adhesion promoters, are required nowadays. WorléeAdd VP 4890 is now part of Worlée's product family of adhesion promoters.

WorléeAdd VP 4890 is a specially modified polyester containing OH groups, which mainly improves the adhesion of solvent-based stoving enamels and polyurethane systems on various metal substrates. Recent laboratory results investigating the adhesion properties in a 2K PUR white lacquer could especially emphasise the adhesion on aluminium and smooth steel compared to market standards (see diagram 1 and 2). The laboratory results also confirmed that the adhesion additives have no negative influence on the gloss, but that the pendulum hardness decreases slightly with increasing additive quantity.

Furthermore, WorléeAdd VP 4890 has no negative influence on weather resistance and has an elasticising effect in higher dosages. In general, the optimum application quantity depends on the formulation and should be determined in laboratory tests. However, it is usually between 1.0% and 3.0%. WorléeAdd VP 4890 is added to the coating at the end of the production process and before viscosity adjustment under careful stirring.

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Powerful partners

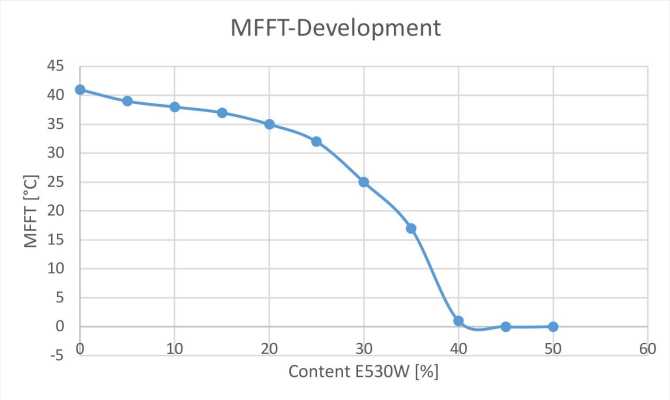
Binder mixtures do not always show the desired properties, but with WorléeCryl 7410 and WorléeSol E 530 W two binders have been discovered, whose properties complement each other very well.

	WorléeCryl 7410	**WorléeSol E 530 W**
Type	Self-crosslinking acrylic copolymer dispersion	Medium oil PU alkyd emulsion
Solid content	45% ± 1	30% ± 1
Viscosity	max. 500 mPas	max. 10.000 mPas
pH-value	8,0 – 9,0	7,0 – 8,5
MFT	39°C	---
TG	45°C	---
Acid value	---	max. 38
Oil content	---	approx. 53%

The self-crosslinking pure acrylic dispersion is characterised by high hardness and good chemical resistance. However, with an MFT of 39°C it requires a very high amount of film-forming agents.

The urethanised alkyd resin emulsion shows better adhesion properties, but has a slower hardness development.

Since WorléeSol E 530 W is well compatible with WorléeCryl 7410, it can completely replace film-forming agents and thus significantly reduce the VOC content. Furthermore, the binder mixture has a positive effect on the drying speed.



For the first time, this combination proved to be positive when determining the abrasion properties by the Taber Abraser (CS17) of a parquet lacquer. The abrasion of the hard WorléeCryl 7410 was too high with 180 mg/1000U. By replacing 20% acrylate dispersion with WorléeSol E 530 W the abrasion could be halved.

Due to the reduction of the solvent consumption and the improvement of the abrasion, the idea for a blackboard coating was born.

1	Water		17,60	
2	Bentone LT		0,30	Elementis
3	**WorléeDisperse 8400 W**	50%ig in water	2,80	Worlée
4	**WorléeAdd 6226**	100%	0,50	Worlée
5	Tafigel PUR 40		0,50	Münzing
6	Iron oxide black		10,00	
7	Blanc fixe Micro		3,00	Sachtleben
8	Dorkafill H		2,00	Dorfner
9	Plastorit 0000		2,00	Imerys
10	**WorléeCryl 7410**	45%ig in water	40,00	Worlée
11	**WorléeSol E 530 W**	30%ig in water	20,00	Worlée
12	Tego Airex 904W		0,50	Evonik
13	**WorléeAdd 3585**	100%	0,30	Worlée
14	**WorléeAdd 3440**	100%	0,50	Worlée
			100,00	

Blackboard lacquer 4.8067-87

VOC	**<1 g/L**
Minimum film forming temperature	**< 1°C**
Viskosity	6.300 mPas
pH-value	7,8
Pendulum hardness 1W RT	48 s
Gloss 60°/85°	13 GE / 27 GE
Chalk on glass 120µm	Well writeable
Wipe away on glass 120µm	yes, minimally visible
Chalk on cardboard 2 x x120µm	writeable
Wipe away on cardboard 2 x 120µm	yes
TG 4	14 min
TG 7	**<1h**
GT steel / aluminium	**0 / 3**
Wet abrasion resistance	class 2

Through a few adjustments and various tests, Mrs. Wiechert was able to formulate a blackboard coating in the application technology laboratory in Lübeck, which even convinced her colleague to carry out a self-experiment in his own home.

Satisfied, Mr. Howe removed his points from the new board after winning the dart duel.

During the formulation process, we noticed the particularly good drying of the binder mixture. Therefore, the combination has a particular advantage because although the acrylic dispersion is still the main component, it no longer requires film-forming agents that have to evaporate first.

	MFT	TG 1	TG 2	TG 3	TG 4	TG 5	TG 6	TG 7
W'Cryl 7410 with 7% Butylglykol	3°C	4 min	6 min	7 min	14 min	1 h	5 h	7-23 h
W'Cryl 7410 with 4% Dowanol PPh	< 5°C	4 min	6 min	13 min	85 min	2 h	6 h	> 24 h
W'Cryl 7410 : W'Sol E 530 W (1:1)	< 1°C	5 min	6 min	11 min	13 min	1 h	1 h	> 24 h
W'Cryl 7410 : W'Sol E 530 W (3:2)	w< 1°C	8 min	13 min	18 min	20 min	43 min	46 min	> 24 h

Dry degrees according to Erichsen

This advantage is now being investigated in a white top coat and a pigmented sanding primer. The first coatings could be sanded without any problems after just one hour and the topcoat formulated showed a drying time comparable to that of blackboard coatings.

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Many greetings from the UK!

Elaxi Chauhan, Account Manager of Worlée-Chemie in the UK

1. How long have you been working for Worlée?
My career with Worlée UK started in September 1995, so exactly 25 years ago. I was appointed as Technical Sales representative covering the Northern part of the United Kingdom. During my 25 years at Worlée I have had many challenges which kept me interested and motivated.

2. Are there any special features for the UK market?
The UK paints and coatings market is controlled by major players, mainly the big multinationals. My biggest challenge is to introduce new and innovative products to small-and/or medium-sized local producers who are competing with the multinationals.

3. What are your tasks in your position?
My role is to work with the technicians to try and find a product that will meet their specification. This is only achieved by keeping in constant contact with our customers and support from our Technical Department.

4. What have you done so far or what training have you completed?
I graduated whilst in employment through a training scheme with a paint manufacturing company. My career has been in the coatings industry throughout my professional life. I started at the bottom working in QA labs and through various training progressed to R&D developing coatings for different substrates and applications.

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Thiocure®: low viscosity VOC-free polythiol compounds from Bruno Bock

BRUNO BOCK THIOCHEMICALS

The main building of the company – the Marschacht facility.

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Since the beginning of our sales cooperation with Bruno Bock in 2009, we have marketed the Thiocure® brand name of reactive, low viscosity and VOC-free polythiol compounds throughout large parts of Asia, Eastern Europe and Central Europe.

The Thiocure® portfolio is composed primarily of esters of mercaptoproprionic acid or thioglycolic acid with polyfunctional alcohols. These high-quality hardeners and binders are used in coatings as well as in adhesives and sealants. Thiocure® products can be combined with nearly all commercially available epoxy-, isocyanate- or acrylate-based resins and allow for modifications to the properties of end products to suit their respective application requirements. These multifunctional, solvent-free polythiols are completely transparent and cover a broad spectrum of reactivity and viscosity levels. For visual applications, the products' high refractive index values of up to 1.6 along with their brilliant appearance are of great significance.

In combination with epoxy resins, Thiocure® products serve as hardening agents for the formulation of coatings, casting compounds, sealants, floor coverings and repair compounds for the construction industry as well as adhesives for the electronics or consumer industry. Their high reactivity allows for the development of fast curing systems with adjustable flexibility and reduced yellowing. Even in lower temperature conditions, curing proceeds at a pace that is distinctly faster than that yielded by a standard amine- or polyamide-based EP hardener.

In combination with isocyanates, Thiocure® products may be used as binders in PU systems or as co-binders with standard PU systems or polyamines in polyurethane or polyurea systems. The SH groups contained in the polythiols react with isocyanate hardeners much more rapidly than do those from the OH group of polyols (polyesters and acrylates). Such systems can cure extremely quickly while simultaneously demonstrating a clear improvement in UV stability. This makes it possible to produce transparent, high-gloss coatings for which the reduced moisture sensitivity in the drying phase enables even thick coatings to cure without the formation of blisters or bubbles.

Thiocure® products can be used **in combination with unsaturated compounds in radiation curing systems as well.** The advantages of UV systems containing Thiocure® include a higher conversion rate for double binders and a very rapid curing speed. Additionally, Thiocure® products reduce oxygen inhibition and shrinkage. This enables the production of flexible systems that demonstrate lower levels of brittleness than in conventional acrylate-based systems.

AREAS OF APPLICATION

Thiocure® polythiols offer **diverse application possibilities** for coatings as well as for adhesives and sealants. Combining Thiocure® polythiols with conventional resins allows for the precise specification of not just curing speed but also chemical and mechanical properties. For high-quality flooring in locations such as production and warehouse facilities or for surfaces used in sports venues and parking structures, the technology of Thiocure® enables formulators to develop products that achieve an optimal balance between resistance, durability and appearance.

Thiocure® products demonstrate higher reactivity in amine-catalysed **epoxy formulations,** thus making them essential for the formulation of fast curing epoxy resin systems, such as 5 minute epoxy resins. Furthermore, they can be used for the formulation of low temperature curing epoxy resin systems for the construction industry.

Adhesives are highly versatile and play an increasingly significant role in today's markets. Thiocure® products can be implemented as hardeners and binders in adhesives; they allow for specific customisation of the adhesives to the requirements of their respective applications in terms of chemical and physical stability, durability and mechanical properties.

Thiocure® products also find application in the area of **polysulphide sealants.** Crosslink densities may be managed by means of dosage level adjustments, thereby yielding technical as well as commercial advantages. With polythiols, modified polysulphides can be used, for example, in airplane construction due to their high levels of kerosene resistance, in particular for sealing kerosene tanks.

As modifying components in **UV curing printing inks,** Thiocure® products can substantially increase curing speeds.

Bruno Bock Chemische Fabrik GmbH & Co. KG is an independently run family-owned company based in Marschacht, Germany. The Bruno Bock Group is the world's leading supplier of high-quality organosulphur products with a sales network extending to agents and distributors in more than 45 countries. The application spectrum of their product offering ranges from cosmetics to cleaning materials to paints, coatings and adhesives, among many other application areas. Furthermore, the company works to develop solutions for new markets, such as 3D printing and display technologies.

Trees for the future

The nationwide "Einheitsbuddeln" took place for the second time on 3 October this year. The idea was introduced by Schleswig-Holstein in 2019, when Germany celebrated its 30th anniversary of the Germany Unity Day. In order to carry on with the newly established tradition, Brandenburg took the sceptre in its hand this year and hosted the tree-planting campaign true to Brandenburg's motto in the year of its presidency: **"WE together".**

From now on, "Einheitsbuddeln" is supposed to take place each year on the public holiday, in order to make an effective contribution to protecting the climate. Because "imagine if every person in Germany would plant a tree on 3 October. 83 million. Every year. A new forest. From north to south, from east to west. For the climate. For you and your families. For our future.", so the motto of the big tree-planting campaign.

Like last year, the Worlée-Chemie didn't want to miss the event to do something good for the environment. Unfortunately, due to the pandemic, no planting team was allowed to gather. Nevertheless, 10 wild pear trees were planted by the caretaker colleagues on the company's property on the Elbe-Lübeck-Kanal at the beginning of November. The wild pear tree is a native wild species from the European region with a high ecological value, because it promotes biodiversity in field hedges or orchard meadows where it finds its place. The tree belongs to the rose family and can reach a height of up to 10 to 15 metres. Even though the fruits of the wild pear are enjoyable for humans, they should rather be left as wild precious food to hedgehogs or other living creatures. Apart from contributing to an enchanting landscape with its remarkable autumn leaves and warm colours, the wild pear tree also helps to provide for the small living creatures around us and is therefore a must-have in every natural garden.

A wild pear tree blooming on a grass green meadow.

Platinum medal for Worlée-Chemie

The Worlée-Chemie has again demonstrated its commitment to sustainability and was awarded with a "Platinum medal" for its outstanding achievements in Corporate Social Responsibility (CSR) Management by the sustainability-rating platform EcoVadis* in July 2020. With a score of 77 points, we are among the top 1 percent of all evaluated companies for the second time.

This year there was a new ranking and EcoVadis introduced "Platinum" in the scorecard for the first time. Our result is therefore comparable with the previous "Gold Status", which we received in our evaluation last year. The new ranks are classified as follows:

Platinum – top 1 percent
Gold – top 5 percent
Silver – top 25 percent
Bronze – top 50 percent

This year's evaluation focused on 21 CSR criteria, which were divided into four areas: environment, labour and human right, ethics and sustainable procurement. We again achieved very good results in all four areas.

We are very delighted about this result, especially because we already received the "Sustainability Leadership Award Small to Medium Enterprise 2020" in the category "Best Performer Heavy Manufacturing" at the EcoVadis Sustain conference in March 2020.

We are still aware of our responsibility and will continue to advocate for and engage in sustainability and supply chain management in the future.


ecovadis

WORLEE-CHEMIE GMBH (GROUP)
wurde mit einer
Platinum medal
zur Anerkennung ihres EcoVadis CSR-Ratings ausgezeichnet
-JULI 2020-

PLATINUM Top 1%
2020
ecovadis
Sustainability Rating

Gültig bis: Juli 2021

*EcoVadis is the first collaborative platform to establish CSR ratings of suppliers for global supply chains. The methodology is based on international CSR standards such as the UN Global Compact, the UN Guiding Principles on Business and Human Rights, the Conventions of the International Labour Organisation, the Global Reporting Initiative and ISO 26000.


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On tour with the "Chemie-Radler" team

From 30th August until 19th September 2020, the town of Lauenburg participated as municipality in this year's "STADTRADELN". The Climate Alliance launched the campaign in 2008 with the aim to encourage everyone to cycle for 21 days. The goal is that people switch to a climate-friendly mode of transportation in order to contribute to climate protection and to reduce Co_2 emissions.

The Worlée-Chemie participated for the second time this year and formed with 12 employees the team "Chemie-Radler". Of the 10 participating teams, the "(Worlée) Chemie-Radler" have reached the second place with 3,017 cycled kilometres (corresponding to 444 kg saved Co_2). We congratulate the team on this great result!

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