



## WHITE PAPER

### Antimicrobial dispersion varnish for self-adhesive labels

#### Relevance of antimicrobial products

In general, germs are transmitted from person to person through direct (skin) contact, droplet infections and smear infections (e.g. via surfaces or products contaminated with germs). Germs sometimes survive on surfaces for a few hours up to several months (e.g. E. coli up to 16 months, influenza up to 2 days and corona viruses up to 9 days). According to current knowledge, the new SARS-CoV-2 corona virus survives up to 24 hours on paper and cardboard. (<https://www.nejm.org/doi/pdf/10.1056/NEJMc2004973>).

#### Assessments by authorities

The Federal Institute for Risk Assessment, Berlin, is the competent authority for this Authority comment regarding surfaces: [https://www.bfr.bund.de/de/kann\\_das\\_neuartige\\_coronavirus\\_ueber\\_lebensmittel\\_und\\_gegenstaende\\_uebertragen\\_werden\\_-244062.html](https://www.bfr.bund.de/de/kann_das_neuartige_coronavirus_ueber_lebensmittel_und_gegenstaende_uebertragen_werden_-244062.html)

The stability of corona viruses in the environment depends on many factors such as temperature, humidity and the nature of the surface as well as on the specific virus strain and the amount of virus. In general, human corona viruses are not particularly stable on dry surfaces. As a rule, the inactivation takes place in the dry state within hours up to a few days. For the novel coronavirus SARS-CoV-2, the first laboratory tests by an American working group show that, after heavy contamination, it can remain infectious as aerosol for up to 3 hours, up to 4 hours on copper surfaces, up to 24 hours on cardboard and up to 2-3 days on stainless steel and plastic.

**Authorities always comment very carefully and cautiously.**

#### The antimicrobial dispersion varnish

Labels with the antimicrobial dispersion varnish reliably and permanently reduces the germ load. The antimicrobial dispersion varnish contains a special patented substance that takes advantage of the principle of photodynamic: This photo catalyst is activated by visible light - transfers this energy to the surrounding oxygen. So-called singlet oxygen is created, which efficiently kills germs by oxidizing the germ shell. The active oxygen is gaseous: It can easily reach and kill the microorganisms on dry and humid surfaces. At around 1 mm, its range is long enough to destroy the microorganisms on the surface, but short enough not to be aimlessly released to the environment. In a nutshell: the antimicrobial dispersion varnish is effective against bacteria, spores, viruses and fungi. As long as visible light and oxygen are available, there is a constant disinfection effect. The antimicrobial dispersion varnish thus helps to close gaps in hygiene, reduce the risk of germ transmission and consequently increase safety for customers.

#### The antimicrobial effect of singlet oxygen

Singlet oxygen has been used routinely in medicine for the treatment of tumors and degenerative diseases for over 20 years. At the same time, the antimicrobial use of singlet oxygen was developed. Resistance development, as can be observed with antibiotics and conventional biocides, does not occur with singlet oxygen. There are currently at least 34 scientific studies proving that singlet oxygen can efficiently destroy a wide variety of viruses. These studies were carried out using scientifically standardized methods and published in peer-reviewed journals.

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### Scientific studies show that the singlet oxygen

- causes the destruction of the viruses by peroxidation of lipids and proteins
- efficiently destroys enveloped and undeveloped viruses
- destroys frequently occurring viruses such as influenza viruses, herpes viruses, noroviruses and HIV
- destroys highly pathogenic viruses such as Ebola viruses and SARS corona viruses

### The antiviral effect of singlet oxygen has been proven for viruses

Ø in suspension

Ø on surfaces

Ø on cells that were virus-infected

### Test Certificates

The antimicrobial dispersion varnish has been tested by independent institutes for its antibacterial effect (test germ: Staphylococcus aureus) in accordance with ISO 22196 (mod.) for paper and cardboard, among others by the Fraunhofer Institute IVV in Munich. A reduction of the bacterial load by 99.5% was proven.

The photo catalyst contained in the antimicrobial dispersion varnish has also been tested for its antiviral effect (based on ISO 21702) in other coating systems by an independent institute. As a representative for enveloped viruses - which also include SARS-CoV-2 - it has been tested against the influenza A virus (test strain H1N1): The reduction of infectious particles by more than 99.98% was proven.

### Health and safety

The photo catalyst contained in the antimicrobial dispersion varnish has been tested by GLP certified laboratories according to OECD standards with the following result:

Non-irritant to skin (OECD 439)

Not irritating to eyes (OECD 492)

Non-sensitizing (OECD 429, DIN 10993-10)

Not mutagenic (OECD 471)

Not cytotoxic (DIN 10993-5)

### Product approval

From a regulatory point of view, dyes and coatings are neither a medical device nor a food contact material. From a regulatory point of view, the addition of an antimicrobial photo catalyst results in a biocidal product which falls under the European Biocide Regulation EC 528/2012. However, according to Article 93 of the Regulation, a transitional period currently applies to additive used in the antimicrobial varnish dispersion coating. This regulation applies to active substances for which no precursor is placed on the market and which are therefore not covered by the old biocide regulation, e.g. reactive oxygen species produced from ambient air ("in-situ" process). Such products may be placed on the market without authorization or approval as long as an associated active substance dossier is under evaluation by the authorities - which is the case for the active substance in use.

<https://echa.europa.eu/de/information-on-chemicals/biocidal-active-substances/-/disas/substance/100.244.511>).

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The product classes which correspond to the antimicrobial dispersion varnish were taken into account. The antimicrobial dispersion varnish can be used and marketed throughout Europe until the evaluation of the active substance dossier is completed.

#### **Advantages of photodynamic over other antimicrobial technologies:**

- requires no UV radiation, only visible light,
- the antimicrobial dispersion varnish shows a reduction of microorganisms already under indoor lighting conditions (99.5%),
- formation of resistance of microorganisms against singlet oxygen is not yet known and not to be expected
- has a controllable efficiency depending on the light intensity
- works on dry surfaces
- does not contain toxic or mutagenic components
- does not release toxic chemicals into the environment
- does not produce odor or aerosol formation

#### **Scientific studies on the antiviral effect of singlet oxygen**

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