ACT CleanCoat™

Part of Premium Purity™

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ANTI-MICROBIAL Surfaces for 12 Months

ACT CleanCoat™

- Surfaces become self-disinfecting after application
- Purifies the air and improves indoor climate
- ***Decomposes microbes such as bacteria, viruses, airborne mold spores, yeasts, algae, organic compounds such as VOCs, and unpleasant odors***
- Approved for use on all surfaces (including surfaces with direct food contact)
- Transparent and odorless coating
- Activated by light

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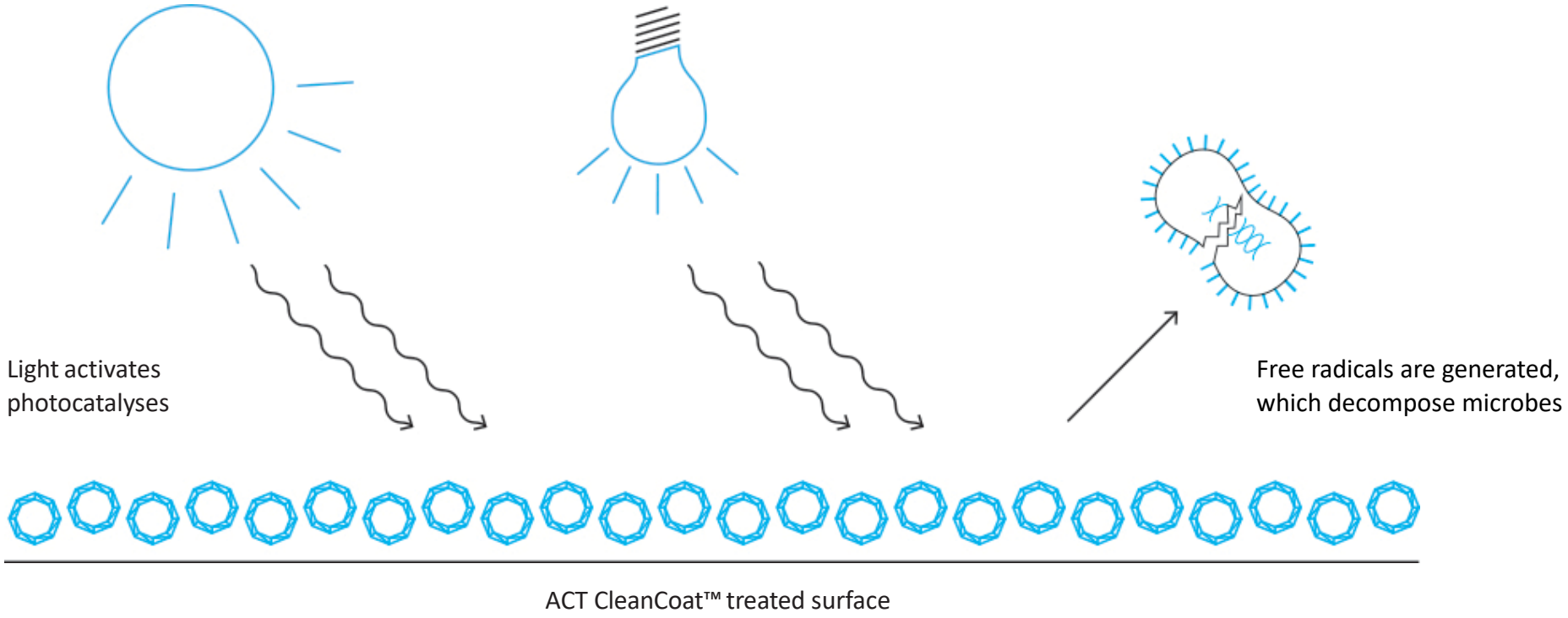
THE PROCESS

ACT CleanCoat™

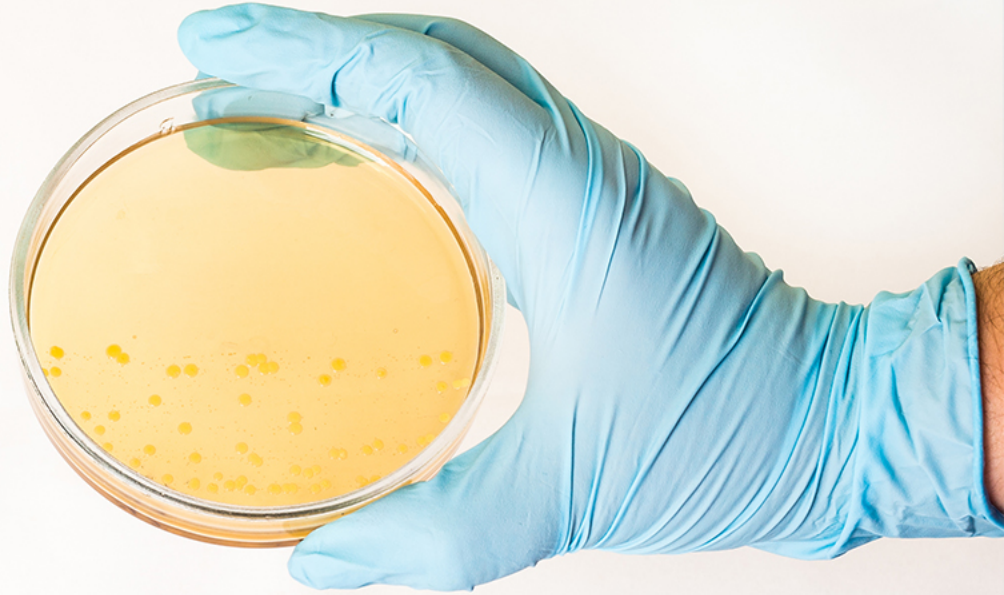


DECOMPOSING Microbes

ACT CleanCoat™

>97%
reduction*

ACT CleanCoat™ has passed 12 European norm (EN) tests conducted on more than 18 different organisms, including microbes such as influenza A, influenza B, salmonella and methicillin-resistant staphylococcus aureus (MRSA)



** Lillebælt Hospital, Denmark. Data: five weeks after application*

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CLEANING the Air

ACT CleanCoat™

>97%
reduction*

Reduces air pollutants, including volatile organic compounds (VOCs) such as formaldehyde, benzene, and acetone as well as NO_x.

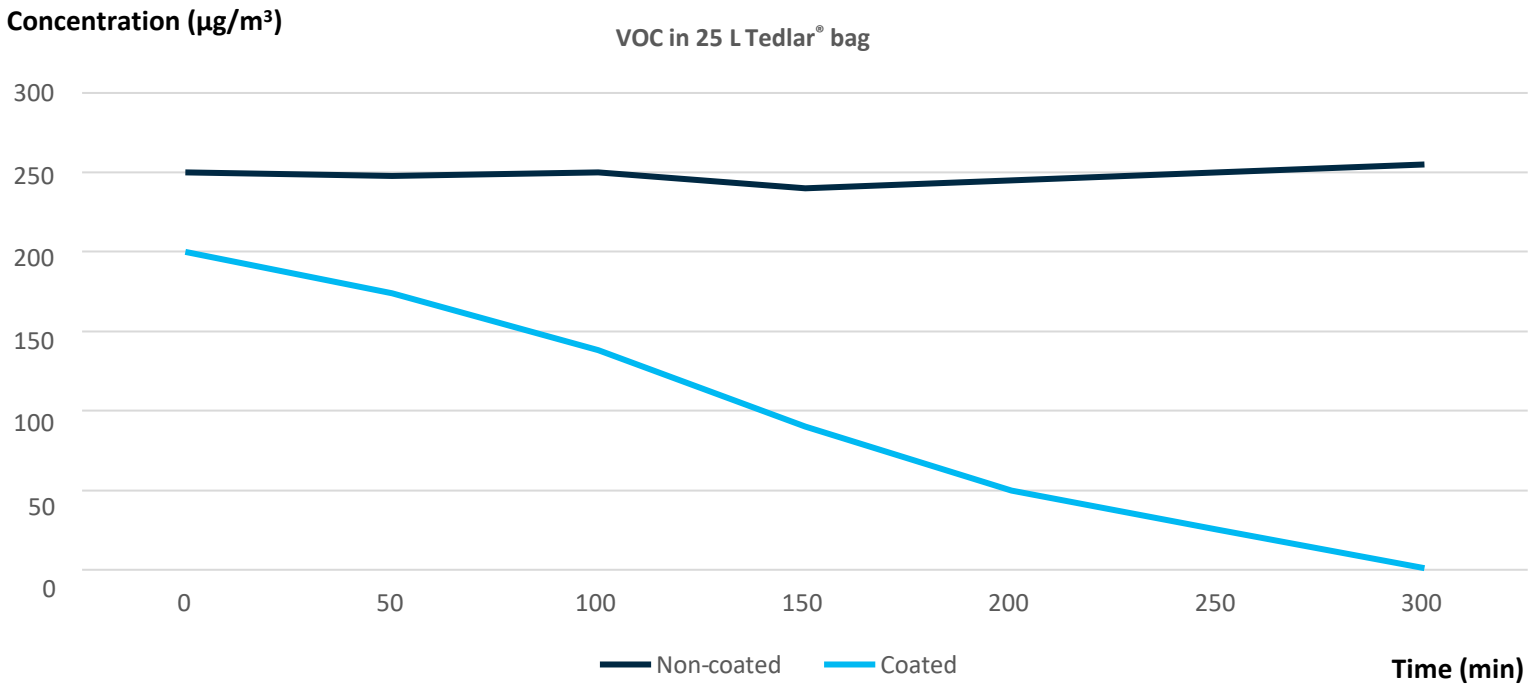
They evaporate easily at room temperature and are emitted from new furniture, carpets, and many electronics. VOCs are known to have adverse health effects on humans, and some are even carcinogenic.

As VOCs are carbon-based, they are decomposed by ACT CleanCoat™. This makes ACT CleanCoat™ an effective air purifier.

** Tile production in Malaysia. VOC type: residual chemical fumes. Data: four months after application*

CLEANING the Air

ACT CleanCoat™



Test performed by the National Research Centre for the Working Environment, Hans Christian Budtz

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CONTROLLING Airborne Mold Spores
ACT CleanCoat™

>98%
reduction*

ACT CleanCoat™ has proven its decomposing effect against airborne mold and yeast by passing these European norm tests

- EN 13624, Stachybotrys (black mold)
- EN 14562, Stachybotrys (black mold)
- EN 13624, *Candida albicans* (candida yeast)
- EN 14562, *Candida albicans* (candida yeast)

** Hospital, Malaysia. Data: Three months after application*

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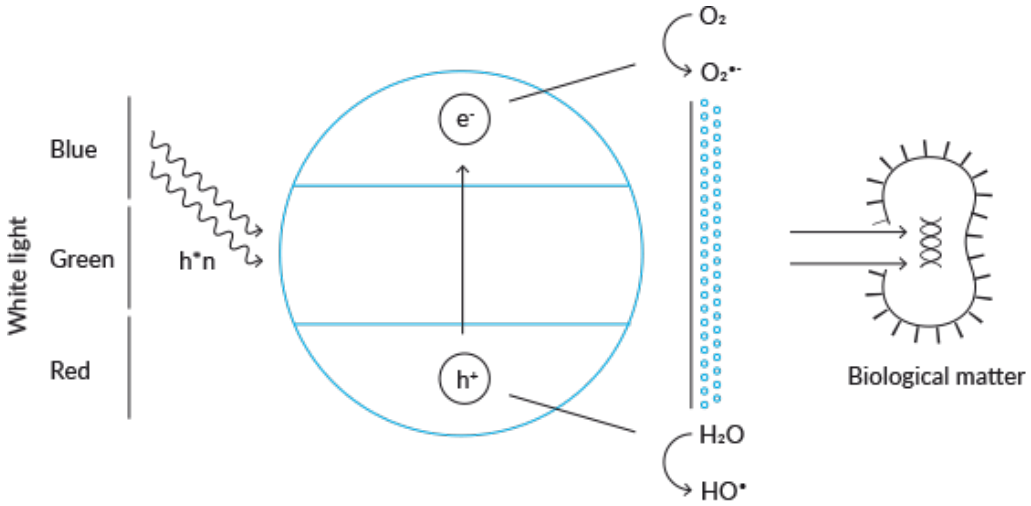
THE CHEMISTRY **Behind**

THE CHEMISTRY Behind
ACT CleanCoat™

The natural decomposition of organic materials can be dramatically accelerated with the use of a photocatalyst such as titanium dioxide (TiO_2). Once applied to any material such charge carriers interact with ambient oxygen and water, generating **highly reactive superoxide and hydroxyl radicals.**

Upon exposure to light (with energy above the TiO_2 band gap), energy-rich electron-hole pairs are produced. These radicals can either directly attack the surrounding unwanted microbial matter or recombine following different pathways forming hydrogen peroxide.



ACT CleanCoat™ treated surface

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THE CHEMISTRY Behind
ACT CleanCoat™

Hydroxyl, superoxide radicals and **hydrogen peroxide** are the reactive oxygen species (ROS) ultimately responsible for the biocidal activity of ACT CleanCoat™ through non-selective oxidation of organic material.

The catalyst (TiO_2) is never consumed during the reaction, ensuring a continuous process during the service life of the coating. The TiO_2 particles in ACT CleanCoat™ are specifically engineered to work in all environments.

$$TiO_2 \xrightarrow{hv} TiO_2\ (h^+ + e^-)$$

$$2h^+ + 2H_2O \rightarrow 2H^+ + H_2O_2$$

$$O_2 + e^- \rightarrow O_2^{*-} \quad \text{(Superoxide)}$$

$$h^+ + H_2O_2 \rightarrow H^+ + OH^* \quad \text{(Hydroxyl)}$$

$$OH^* + OH^* \rightarrow H_2O_2 \quad \text{(Hydrogen peroxide)}$$

$$O_2^{*-} + e^- + 2H^+ \rightarrow H_2O_2$$

THE CHEMISTRY Behind
ACT CleanCoat™

Free radicals induce oxidative stress, and they attack all major classes of biomolecules, mainly the polyunsaturated fatty acids, also known as lipids, of the cell membranes.
The free radicals in ACT CleanCoat™ work by oxidation and attack the cell membrane of microbes - in other words the microbes decompose.

The oxidative degradation of lipids, known as lipid peroxidation, is very destructive as it proceeds as a self-perpetuating chain reaction. After the destruction of the cell wall, the free radicals will proceed to oxidize the cell core.

Due to the constant high oxidative rate of the free radicals, the oxidations of the cells will create water, carbon dioxide, and minerals. Both the water and carbon dioxide will evaporate, leaving the minerals of the cells on the surface.

PASSED European Norm Tests

ACT CleanCoat™

EN number	Organisms
EN 13704	*Bacillus subtilis*
EN 13624	*Aspergillus brasiliensis, Candida albicans*
EN 13697	*Aspergillus brasiliensis, Candida albicans*
EN 14562	*Aspergillus brasiliensis, Candida albicans*
EN 14348	*Mycobacterium avium*, *M. terrae*
EN 14563	*Mycobacterium avium, M. terrae*
prEN 16777	Adenovirus, Murine norovirus
EN 14476	Poliovirus, Adenovirus, Murine norovirus
DSEN 14476	EV-71, Influenza A, Influenza B
EN 13727	*Pseudomonas aeruginosa*, *Staphylococcus aureus*, *E. hirae*, Salmonella, MRSA
EN 13697	*Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Enterococcus hirae*, *Escherichia coli*
EN 14561	*Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Enterococcus hirae*

DOCUMENTATION

ACT CleanCoat™

ACT CleanCoat™ has passed several European norm tests.
The tests have been conducted and confirmed in cooperation with renowned laboratories such as:

- Dr Brill and Steinman, Germany
- ISI Food Protection, Denmark
- Chang Gung University, Taiwan
- Statens Serum Institut, Denmark

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