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FAQ on Argentum 20

Q: If Argentum 20 prevents the growth of bacteria, how long the bacteria itself can live on painted surface? What happen with bacteria which appear on painted surfaces of Argentum 20?

A: The number of viable bacteria decreased 99,99 % during 24 h exposure to painted surface according to ISO 22196 test.

Q: What about rest of bacteria? What happens with them? Will they decreased till 100% after longer time then 24h?

A: The test is made according to the international standard ISO 22196, in which the test time is 24 hrs. This is how all (including competitors) should test their products.

One could speculate decreasing of number of viable bacteria to continue. In real life, though, re-contamination from surroundings, would occur simultaneously.

Q: One of my customer have problem with paint in hospital. There are UV lamps to destroy bacteria. Over time there is problem with unidentified smell and they think it is from paint.

A: The origin of the odor stems probably from the fact that UV-radiation decompose especially unsaturated compounds. These decomposition reactions form so called secondary emissions, which may be odors and are stable. The secondary compounds may react further in gaseous phase to form new compounds (which may be odors and are stable). Such compounds may readily be adsorbed into building materials and furniture. The origin of unsaturated compounds in indoor premises is e.g. outdoor air, cleaning agents and disinfectants, building materials (walls, floors, ceiling), furniture and personal care products. Thus, it is impossible to specify which source(s) generates unsaturated compounds, and taking this fact into consideration you may recommend Feelings Extra Durable and/or Argentum 20 for painting the walls.

Q: How long does anti-mould agent stay in painted surface of Argentum 20 and Luja 20? After how many wash cycles it is removed from the paint?

A: Anti-mould agent works through the maintenance interval of the paint surface. Maintenance interval is subject to the wear from surroundings (i.e. the cleaning interval).

Q: Is Argentum 20 resistance for disinfectants and detergents the same as Luja's 20? Are there any differences between them? Are these products resistant to the same substances?

A: Both products have excellent chemical resistance of WB wall paints. There is available chemical resistance tests made by a Lithuanian research center for Argentum 20 (Test report NO. KAM 16/20).

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Q: Is frequent washing cause leaching of any ingredients, which are responsible for killing bacteria?

A: In order such ingredients to work they should basically be soluble. Normal wearing of wall paints due to cleaning, wiping, scrubbing etc., should renew the surface. One could assume the surface being active

Q: If customers ask us of tests results for Argentum 20 according to ISO 22196 test, whether and what form be possible to share these results with them?

A: There is available a statement: "Defining antibacterial activity of Argentum 20 by Tikkurila Oyj according to standard ISO 22196" (31.3.2016). Attached to it there is a "Technical Service Report B/15/0532 (19.5.2015). Together they may be shared with a customer.

Q: How does contained silver in Argentum 20 work? What is the silver mechanism of action?

A: (Silver mode of action was reviewed by V. Edwards-Jones (2009, 1).) Metallic silver, a known bactericide, slowly releases silver ions toxic to bacteria. Silver cation (Ag^+) is a highly active chemical which binds strongly to electron donor groups containing sulphur, oxygen or nitrogen. Biological molecules generally contain these components in the form of thio-, amino-, imidazole, carboxylate- and phosphate groups. Silver ions act by binding to thiol groups on bacterial membranes, displacing other essential metal ions such as Ca^{2+} or Zn^{2+} , and thus increasing cell membrane permeability (1, 2, 3, 4). Silver ion may enter the cell itself and thus inhibit a number of important transport processes, such as phosphate and succinate uptake and can interact with cellular oxidation processes as well as the respiratory chain (1, 5). When entering the cell silver ion may also bind to DNA and prevent replication (1, 2, 3, 5). Silver is effective against a broad spectrum of bacterial strains while minimally affecting human cells.

References:

1. Edwards-Jones V. 2009. The benefits of silver in hygiene, personal care and healthcare. *Lett Appl Microbiol.* 49:147-52.
2. Feng QL, Wu J, Chen GQ, Cui FZ, Kim TN, Kim JO. 2000. A mechanistic study of the antibacterial effect of silver ions on *Escherichia coli* and *Staphylococcus aureus*. *J Biomed Mater Res* 52:662-8.
3. Fox, C. L., and S. M. Modak. 1974. Mechanisms of silver sulphadiazine action on burn wound infections. *Antimicrob. Agents Chemother.* 5:528–588.
4. Liau, S. Y., D. C. Read, W. J. Pugh, J. R. Furr, and A. D. Russell. 1997. Interaction of silver nitrate with readily identifiable groups: relationship to the antibacterial action of silver ions. *Lett. Appl. Microbiol.* 25:279–283.
5. Modak, S. M., and C. R. Fox, Jr. 1973. Binding of silver sulfadiazine to the cellular components of *Pseudomonas aeruginosa*. *Biochem. Pharmacol.* 22:2391–2404.

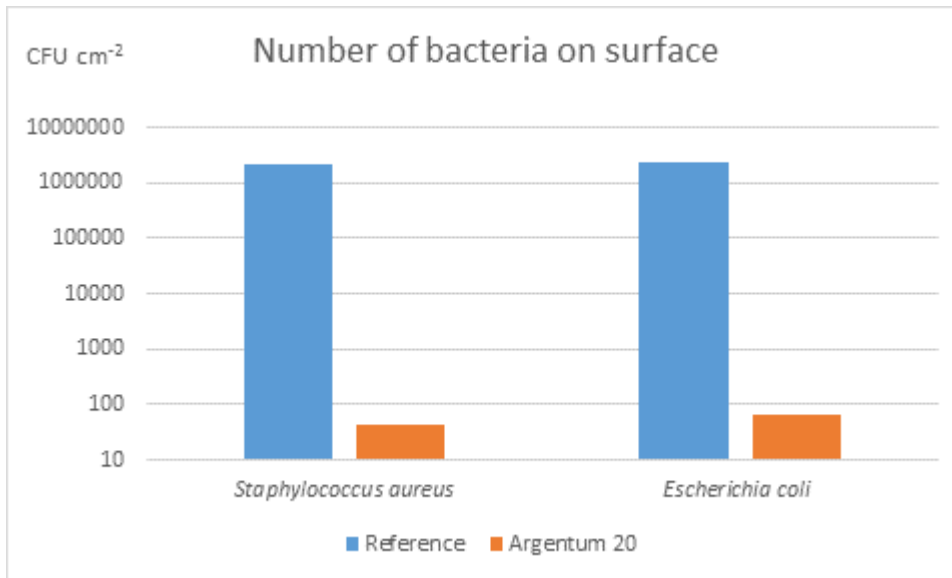
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6. P. Dibrov, J. Dzioba, K.K. Gosink, C. Hase. 2002. Chemiosmotic mechanism of antimicrobial activity of Ag⁺ in *Vibrio cholera*. *Antimicrob Agents Chem* 46: 2668–2670

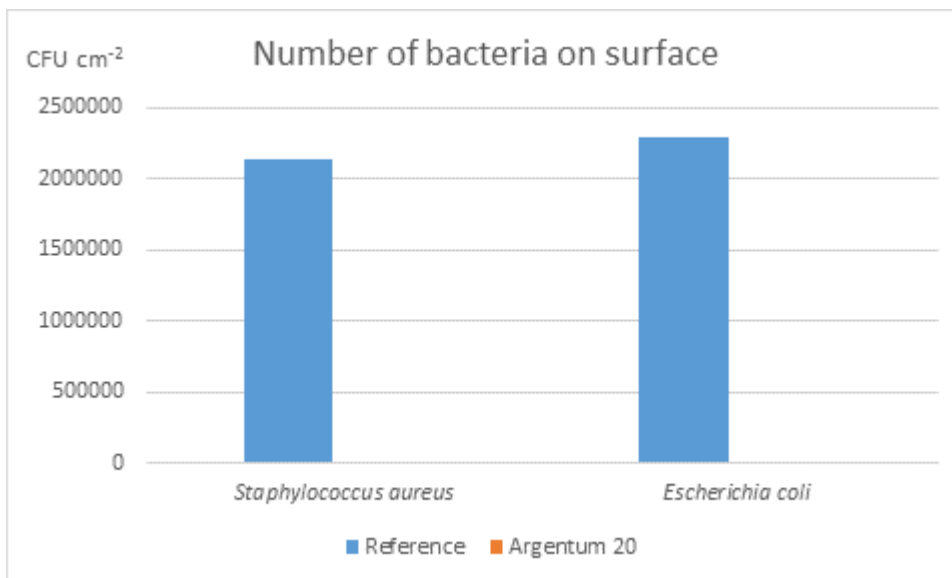
- A: Argentum 20 prevents the growth of bacteria on painted surfaces => How long that feature stays on painted surface? Is that feature stay effective in the same way for whole lifetime of the coating?
- A: Argentum 20 has it's feature as long as there are silver ions on the surface of the coating.
- Q: How did you check coverage? What norm did you use?
- A: It is based on measurements based on international standard ISO 6504-3 and experience please compare to technical datasheets eg: Optiva 3 ceramic or Vivacolor Interior Kitchen:
- http://www.tikkurila.pl/farby_dekoracyjne/produkty/tikkurila_optiva_ceramic_super_matt_3#opis_produkty
 - <http://www.vivacolor.ee/tooted/>
- A: What is the recommended wet film thickness to receive feature of preventing the bacterial growth?
- A: Even one coat is sufficient i.e. wet film thickness 125 - 200 µm.
- Q: If scrubbing may weaken the effect of silver ions? If yes, how can we describe it?
- A: As long as there are silver ions on the paint surface It will remain active. The paint is homogenous and the silver is evenly spread.
- Q: Are there any factors which may cause weakness / loss of activity of silver ions (e.g. UV lamp, others – which ones?) which can be used in premises where high aseptic/standards of hygiene is required?
- A: As far as the silver ions and bacteria do get together it's functional.
- Q: Do you have any references places where Argentum 20 was used? Would it be possible to use these places in marketing material / www as a reference objects?
- A: Unfortunately this far we have none to use.
- Q: There is written that:
Argentum 20 prevents bacterial growth on painted surfaces thanks to active silver contained in the paint. It has been tested according to standard ISO 22196. The bacterial strains used in the standard are *Staphylococcus aureus* ATCC 6538P and *Escherichia coli* ATCC 8739. => Can you say more about it and visualize these results? Can we show and place any results/numbers from these tests in TDS/marketing material? Is it possible to compare these results to something?

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A: Please have a look on the paragraphs 1 and 2 below. For further assistance please contact your local RDI (more details in Technical Service Report B/15/0532 (19.5.2015)).



Paragraph 1. Number of viable bacteria on the surface of reference paint (left) and Argentum 20 (right) after 24 hrs period. Numbers shown in logarithmic scale.



Paragraph 2. Number of viable bacteria on the surface of reference paint (left) and Argentum 20 (right) after 24 hrs period. Numbers shown in arithmetic scale.