ZShield24™
ALL DAY, ALL MONTH PROTECTION

PRODUCT UPDATE: PROTECTIVE EFFICACY

SYNOPSIS

Over the past 2 months, **ZShield24™** has been working closely with a fully accredited, **EPA**-Registered, **AOAC**-Approved, **ISO**-Certified and **ANSI**-Certified laboratory, which is widely respected in the testing of microbiological presence/absence for product research and development.
We have asked them to assist us in a comprehensive assessment of our new products:

BACKGROUND

ZShield24™ employ a natural bio-polymer called Chitosan. Chitosan is a substance extracted and refined from the exoskeletons of crustaceans in this case, snow crabs. Chitosan has been fully reviewed, in use in numerous industries and approved by the:

- **FDA** - Approved for both skin contact and inclusion in prepared foods
- **USDA** - Approve for application to roots, plant foliage, soil and harvested fruits and vegetables
- **GRAS** - It has achieved the coveted title of being "Generally Regarded As Safe"
- **EPA** - Exempt from FIFRA Registration due to its lack of human toxicity, coupled with its known antimicrobial properties.

Our **ZShield24™** Products have been carefully prepared with a blend of purified water and other natural ingredients to create a new generation in protective coatings. **ZShield24™** contain no synthetic substances, creates a natural and sustainable crystal-clear, microscopic polymeric film that has superior advantages over other antimicrobials:

- Contains no heavy metals as do those which contain nano-silver
- Is non-leaching as do those that contain QAC ingredients
- Does not create a 3-dimensional field which may inhibit proper cleaning or be destroyed with friction.
- Is perfectly suitable for use on glass and all soft or hard surfaces
- Requires no unreasonable PPE's

We had read all of the academic studies and scholarly articles, but we wanted to know EXACTLY how good our product was.

TEST NUMBER 1 - LIMITED TIME TEST OF BROAD EFFICACY

In this first test, we studied the microbial efficacy of **ZShield24™** against three distinct classes of pathogens, seeking to establish the breadth of its efficacy. The three microbes selected were: Bacillus subtilis (a gram-positive bacteria), Aspergillus niger (black mold), and Candida albicans (yeast spore). The test was conducted on numerous carriers of a singular substrate over just 7 days, with readings at Time Zero (directly after inoculation), 3, 6, 24, 48 hours, and at the conclusion of the 7 days.

Step 1 → The surfaces of 3 carriers were pretreated with **ZShield24™**.
Step 2 → 6 carriers were inoculated with the test organisms so as to create 3 positive control carriers.
Step 3 → Positive and Negative (uncoated, no organism) Control carriers were set aside in a secure location.
Step 4 → The results were collected and reported as follows:

OGANISM (ATCC)	INITIAL INOCULUM	TIME ZERO	REDUCTION ACHIEVED	3 HOURS	6 HOURS	24 HOURS	48 HOURS	7 DAYS	REDUCTION ACHIEVED
B. subtilis (6633)	1.14×10^5	10	100.00%	<10	<10	<10	<10	<10	100.00%
A. niger (16404)	4.80×10^6	200	99.96%	210	70	120	10	<10	100.00%
C. albicans (10231)	2.00×10^6	1000	99.95%	12500	2500	210	190	10	99.95%

Conclusion **ZShield24™** was proven to be:

- Immediate effective against a gram-positive bacteria,
- Effective within 48 hours against black mold, and
- Ultimately fully effective against the C. albicans yeast spores.

TEST NUMBER 2 - FOUR SUBSTRATES @ 30 DAYS

In the second study, we selected a single pathogen, Staphylococcus aureus (ATCC 6538), a common and troublesome pathogenic organism and treated three hard surfaces (plastic, laminate, stainless steel) and one soft surface (cotton) over a 30 day period. We then challenged the coated surface with a weekly cleaning routine, using rayon wipes and chlorine dioxide disinfecting solution. We had hoped to maintain 3-Log reduction (99.9%).

Preparation of substrates: Each of the multiple test carriers were coated with **ZShield24™** only once at the beginning of the analysis, allowed to dry for 1 hour and then inoculated with the test pathogen. Four times during the study, the substrate was cleaned with a **Synergy™ ProTab™ Cleaning Cloths** hydrated in a 50 ppm aqueous solution (**Synergy ENVIROTAB™**) to determine if the single application of **ZShield24™** could withstand repeated contact with the chemical and mechanical action of cleaning. Each time after cleaning, the surface was reinoculated with the pathogen, and sampling resumed.

Below are the results:

ZShield24™

TEXTILE	INITIAL INOCULUM	7 DAYS	1ST REINOCULATION	14 DAYS	2ST REINOCULATION	21 DAYS	3ST REINOCULATION	30 DAYS	REDUCTION SUSTAINED
Plastic	1.78×10^5	0.00	1.25×10^7	0.00	1.18×10^6	0.00	1.25×10^6	0.00	**99.99%**
Laminate	1.78×10^5	0.00	1.25×10^7	0.00	1.18×10^6	0.00	1.25×10^6	0.00	**99.99%**
Stainless Steel	1.78×10^5	0.00	1.25×10^7	0.00	1.18×10^6	0.00	1.25×10^6	0.00	**99.99%**
Cotton	1.78×10^5	0.00	1.25×10^7	0.00	1.18×10^6	0.00	1.25×10^6	0.00	**99.99%**

Conclusion **ZShield24™** were proven to:

- Continuously execute its biostatic antimicrobial power over Staphylococcus aureus.
- Hold up against periodic cleaning with **ENVIROTAB™** and **ProTab™** Compressed Cloths.
- Maintain efficacy well beyond target.

TEST NUMBER 3 - PROTECTING SURFACES AGAINST VIRAL CONTAMINATION

Context: Antimicrobial coatings cannot replace regular cleaning or periodic disinfection. Antimicrobial coatings are employed to reduce the risk of interaction with living and active microbes by protecting surfaces from contamination and colonization. Coated surfaces won't sustain the life or growth of microbes - this is a unique characteristic of antimicrobials that disinfectants can't generally claim. In short, disinfectant only work while they are wet, antimicrobials work for days and weeks after they dry.

What we found: When a surface was treated with **ZShield24™** and left to age for over 30 days and was inoculated with Feline Calicivirus (a surrogate for norovirus),the virus was virtually neutralized. This coating successfully protected the surface from viral contamination, reducing the risk of transference. Furthermore, we were limited to 4 hours of exposure, and from all testing conducted, we have found that the longer the microbe is exposed to **ZShield24™**, the greater the success of compete neutralization.

SKIN TEST SUMMARY

Employing a combination of AOAC [Method 960.09] and USP [Method 51:Antimicrobial Effectiveness], our **ZShield24™** All-Natural Hand Care Protection was challenged over 24 hours by Staphylococcus a. [ATCC 6538]. A sanitized sample of porcine skin was treated with **ZShield24™**, allowed to dry, and was inoculated with the bacteria. The results were as follows:

- At 4 hours, the initial bacterial contamination had been reduced by 99.957%
- At 6 hours, the initial bacterial contamination held a reduction of 99.956%
- At 24 hours, the initial bacterial contamination still demonstrated a reduction of 99.89%.

Conclusion, **ZShield24™** All-Natural Hand Care Protection can effectively defend your hands against bacterial contamination.

For more information on **ZShield24™** please see our product information sheet and visit our website, ***zshield24.com***, where you can sign up to stay informed.