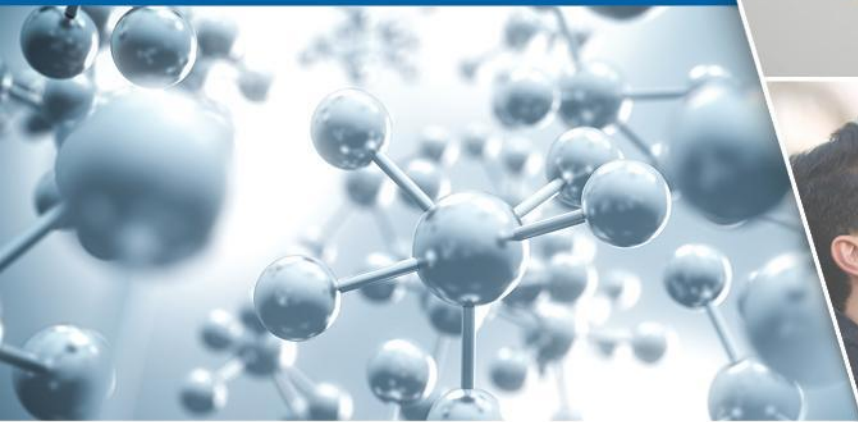


ActivShield™

Rapid Decontamination of N95 Respirator Masks

Aptar
CSP Technologies



Problem Statement

- The global COVID-19 pandemic has resulted in an acute shortage of PPE, specifically N95 Respirator masks.
- Extensive re-use of these single use devices by healthcare workers is occurring without the ability for decontamination
- CDC recently recognized the decontamination and re-use of N95 masks as a crisis capacity strategy.¹



¹ <https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/decontamination-reuse-respirators.html>



ActivShield™



ActivShield™ strips are 10mm x 10mm x 0.3mm thick

ActivShield™ is a safe and convenient way to deliver antimicrobial & antiviral treatment of masks on site.

ActivShield™ production can quickly ramp to 10 million per week

Instructions For Use

Pending FDA Approval

Items Needed



Used, formed
N95 Mask



Gloves



Permanent Marker



Tweezers



ActivShield™
10x10mm film



Tap Water



1 gallon sealable
plastic bag



Paper Bag

ActivShield™

1



Label plastic bag with the mask owner's name, date, and time. Put on gloves, open vial, remove 1 full strip, and close vial immediately. Use tweezers to handle strip. Keep vial closed when not in use.

2



Immediately after removing strip, fully submerge it in water for 2 seconds. Complete this step within 5 minutes of removing strip from vial.

3



Place wet strip into bag immediately after submerging in water.

4



Inspect mask to ensure it is not structurally compromised. Then place used, formed mask in bag. Mask should not be on top of or touching the strip.

5



Seal bag completely and wait at least 2 hours. During this time the strip is releasing ClO_2 gas to decontaminate the mask.

6



Remove mask from bag and mark the strap with a permanent marker. A new mark must be added after each treatment.

7



Transfer mask to fresh paper bag labeled with owner's name. Mask is now ready for use.

8



Be sure to discard the plastic treatment bag with used strip inside. The strip cannot be re-used.

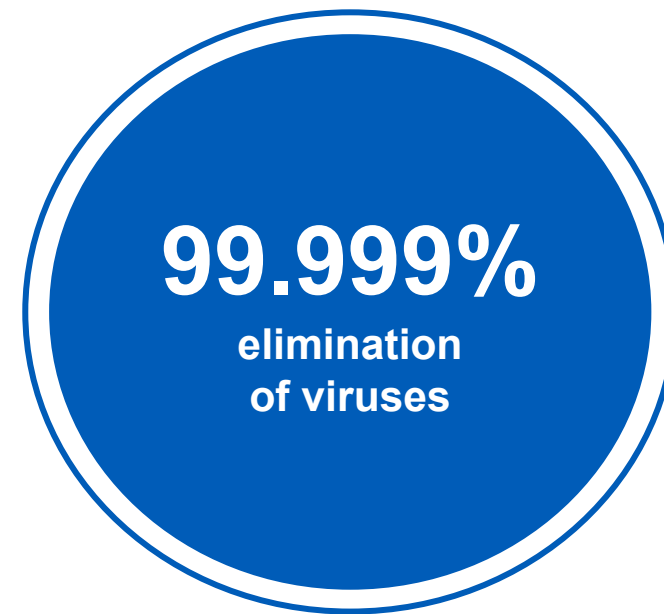
Public Data

- Chlorine dioxide (ClO_2) has been widely used for pathogen reduction and disinfection across industries, including water treatment, food processing, healthcare, and laboratories.
- Effective concentrations range from 0.03 ppm to 100 ppm, depending on substrate and pathogen.

ActivShield™ Effectiveness Data on Viruses

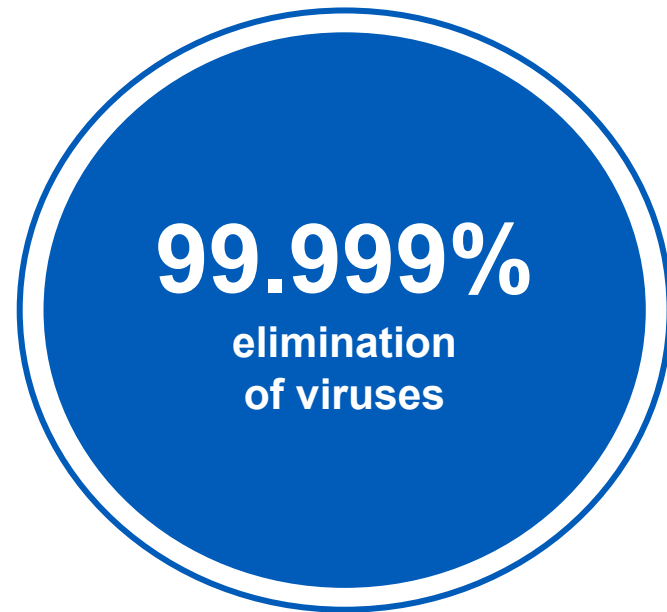
Originally developed for food safety, the technology achieved a >5 log reduction during challenge studies against:

- **Human Norovirus: GII.4 Sydney**
- Feline Calicivirus (ATCC VR-782)
- Tulane Virus (TnV)
- Hepatitis A



ActivShield™ Efficacy Virus Data on Masks

Feline Calicivirus (ATCC VR-782) was spot inoculated in four locations on a N95 mask. After treatment, a 5.2 log reduction was observed compared to control.

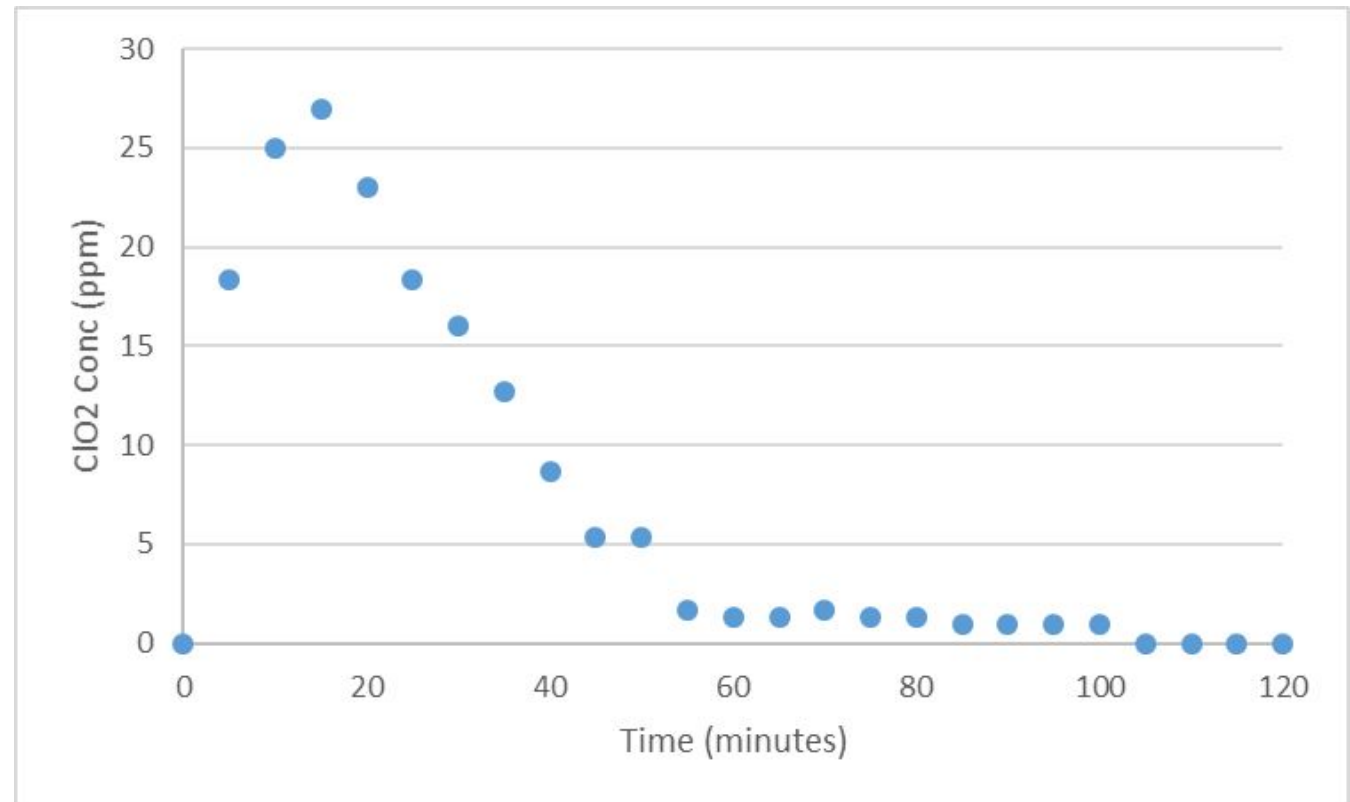


ClO₂ Gas Dosing in Sealable Bag

CSP Auburn, AL Lab Test

- ClO₂ level 15 ppm within 20 min
- ClO₂ level zero within 120 min, resulting in no residual odor and no hazard for the user

ClO₂ Gas Concentration in Headspace Over Time



Reusability of Masks

- Decontamination of N95 masks for re-use must not degrade filtration performance or degrade any mask components.
- SGS Laboratories using the NIOSH testing process confirmed after 12 ActivShield™ treatments the N95 mask had no degradation.
- Auburn University validated that after 10 uses of the technology ActivShield™ on masks the filtration efficiency was >95%.

This was equal to the control without treatment.

Recap

- Chlorine dioxide gas is well known for its ability to reduce pathogens.
- ActivShield™ (single strip) achieved a >99.999% reduction (5.2 log) in Feline Calicivirus on masks.
- Masks still achieve >95% filtration after 10-12 cycles, certified by SGS Laboratories, Auburn University, and Georgia Tech.
- In a sealed 1 gallon plastic bag, the ActivShield™ strip is achieving over 15 ppm of chlorine dioxide with a mask.
- As soon as the mask is removed from the bag, the PPM level around the mask is not detectable with instrumentation, and zero ClO₂ level was detected even with 5x normal dose inside bag with mask.
- This solution can easily be implemented on site.
- CSP can quickly scale to be able to supply over 10 million week.

ActivShield™

**For more information visit:
www.aptaractivshield.com**