

# Antiviral Finishing with Echozan Based Chemical On Ready for Dyed Fabrics in Medical Textiles

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**Abstract:** In conjunction with an increasing public awareness of infectious diseases, the textile industries are developing hygienic fabrics by the addition of various antiviral compounds. In the current study, ECHOZAN-bk is applied to cotton fabrics (Ready for Dyed) in order to gain antiviral properties. The fabric samples are processed in two methods, those are Boiling - off method and then Padding Method. The Boiling – off method is done at three concentrations as 40°C, 50°C and 60°C at the time of 10 minutes. Then, the padding methods are done at sudden padding, at the time interval of 5 minutes and also the time interval of 10 minutes. The overall idea was to notice that the effect of fabric on finishing agent by various concentrations and time. We are planned to make the test in both padding method and boiling off method, and to test the Morphological test (SEM Analysis, FTIR Analysis) and to find the variations of the concerned samples. According to the test results, the modified textile goods attained very good antiviral properties. Thus, the results of the present study clearly suggest that every tested samples were well settled with the concerned chemical and among the variance results, the samples of 40 °C (Boiling- Off method) and then the sudden treatment of padding (Padding method) provides good fixation of the chemicals and yields parallel smoothening of the fabric. In the treatment of higher time and temperature the Echozan-bk starts to evaporate and the results are not upto the expected level. Thus, the results of the present study clearly suggest that ECHOZAN treated textiles at moderate time and temperature can be considered in the development of antiviral textile finishes.

**Keywords:** Antiviral, Boiling off method, Echozan-bk, FTIR Analysis padding method, SEM analysis.

## 1. Introduction

Any woven or non-woven material made from synthetic or natural material is a Textile. Textile products include a broad variety of applications in fields such as clothes, food manufacturing, building goods, automobile industry, military, medical industry, sporting equipment, livestock, and home furnishing. Properties of textiles such as high-temperature stability, elasticity, waterproof, biodegradability, or having antimicrobial activity are determined by the basis of use.

Textiles may help contribute to the transmission of pathogens. Viruses do not have their own metabolism and can thus only live outside a host for a short amount of time, they do not reproduce there unlike bacteria. Even as the hands can

collect and disperse germs that cause infection, so can textiles. Textiles that come in daily touch with hands have been shown to lead to the transmission of viruses. It is believed that clothes and medical textiles, such as bed sheets and towels, might theoretically spread a virus if viruses were infected on the inside.

COVID-19 can be transmitted from an infected person by exhaling or emitting body fluids or virus-containing aerosol particles which are then attached to the surfaces and then the receiver comes in contact with it.

Additional experiments are desperately required to curtail the transmission of viral infections. The usage of respiratory protection equipment has been proven to be an important non-pharmaceutical technique to mitigate the transmission of respiratory viruses, especially when used in close touch with a person with symptoms.

A lot of opportunities have been created for the application of innovative finishes due to rapid growth in technical textiles and their end uses. Antiviral finishes can be applied onto fabrics using many methods- Present nanotechnology developments provide a forum to reduce the possibility of infectious agent transmission. A possible path to this perspective is equipping antiviral elements for the personal protective devices. Such an essential switch can be achieved by incorporating the antiviral nanomaterials in the fibers or non-woven fabrics that are typically used as facial protective materials. Eco friendly or sustainable methods are also being used these days in order to get antiviral finish on textiles. For example, the use of chitosan and natural dyes has been seen to be working. Other herbal methods like tulsi, aloe vera, tea tree oil and eucalyptus oil are also being used as a finish.

Researchers and scientists are also working towards use of various chemicals like sodium pentaborate pentahydrate and triclosan to cotton fabrics in order to gain antimicrobial and antiviral properties.

This article is a review of antiviral and anti-microbial finish found out by the scientists from the Hohenstein Institute in Bönningheim using various organic and inorganic colloidal or nanoparticle copper compounds and copper complexes.

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## 2. Objectives

- To impart the anti-viral finishing to the 100% cotton woven.
- To introduce the reactive type of chemical finishing by using Echozan-bk.
- To make the finishing as short durable by micro encapsulation technique.
- To check out the reactive rate of the Echozan-bk in finished 100% cotton woven by using FTIR technique.

## 3. Materials

### A. Cotton

Specifications:

- Warp count: 40's
- Weft count: 40's
- EPI: 81
- PPI: 77
- GSM: 179
- Width: 60 inch
- Weave: Plain

## 4. Methodology

### A. Boil off Method

The materials contain natural impurities or impurities that result from processing. These are removed by boiling off method. If the process is performed at boiling temperature, it is known as boiling off, if it is performed under pressure.

We have been done by the three method of boil off process at the different temperature. They are

- Boil at 40°C
- Boil at 50°C
- Boil at 60°C

#### 1) Boil 40°C

Take the pre-treated sample & dip the sample into the water for the absorbency of the water.

- Take a dye bath and maintain the temp at 40°C for 10 minutes.
- Add the Echozan bk chemical on the dye bath.
- Dip the fabric on the dye bath.
- Treat the fabric for 10 minutes in the dye bath. At the temp 40°C.
- After treat the fabric squeeze the fabric and make it dry.

#### 2) Boil at 50°C

- Take the pre-treated sample & dip the sample into the water for the absorbency of the water.
- Take a dye bath and maintain the temp at 50°C for 10 minutes.
- Add the Echozan bk chemical on the dye bath.
- Dip the fabric on the dye bath.
- Treat the fabric for 10 minutes in the dye bath. At the temp 50°C.
- After treat the fabric squeeze the fabric and make it dry.

#### 3) Boil at 60°C

- Take the pre-treated sample & dip the sample into the water for the absorbency of the water.
- Take a dye bath and maintain the temp at 60°C for 10 minutes.
- Add the Echozan bk chemical on the dye bath.
- Dip the fabric on the dye bath.
- Treat the fabric for 10 minutes in the dye bath. At the temp 60°C.
- After treat the fabric squeeze the fabric and make it dry.

### B. Padding Method

The pad dyeing machines overcome the deficiency of winch and jigger dyeing machine of smaller batch size and discontinuity in dyeing. Padding mangles offer continuous process of the fabric in concerned liquor, such as pretreatment, dyeing or finishing.

We have been done by the three method of padding method at the different time. They are,

- Sudden treatment method
- 05 minutes treatment method
- 10 minutes treatment method

#### 1) Sudden Treatment Method

- Take the pre-treated sample & dip the sample into the water for the absorbency of the water.
- Add the Echozan bk chemical on the dye bath.
- Make the solution of the Echozan bk chemical on the bath tub by the calculated ratio
- Take the bath tub and sudden dip on the Echozan bk chemical solution.
- Place the fabric on the padding mangle to fixation of the Echozan bk chemical on the fabric and make it dry.

#### 2) 05 minutes Treatment Method

- Take the pre-treated sample & dip the sample into the water for the absorbency of the water.
- Add the Echozan bk chemical on the dye bath.
- Make the solution of the Echozan bk chemical on the bath tub by the calculated ratio.
- Take the bath tub and soaked for 05mins on the Echozan bk chemical solution.
- Place the fabric on the padding mangle to fixation of the Echozan bk chemical on the fabric and make it dry.

#### 3) 10 minutes Treatment Method

- Take the pre-treated sample & dip the sample into the water for the absorbency of the water.
- Add the Echozan bk chemical on the dye bath.
- Make the solution of the Echozan bk chemical on the bath tub by the calculated ratio.
- Take the bath tub and soaked for 10mins on the Echozan bk chemical solution.
- Place the fabric on the padding mangle to fixation of the Echozan bk chemical on the fabric and make it dry.

## 5. Results and Discussion

### A. SEM Analysis

#### 1) Boil at 40°C

The analysis test was done at the sample size from 200 micrometers to 5 micrometers at average width of 10mm and it is observed that the chemical content is sedimented on the fabric completely and provides better results.

#### 2) Boil at 50°C

The analysis test was done at the sample size from 200 micrometers to 5 micrometers at average width of 10mm and it is observed that the chemical content is sedimented on the fabric is completely but is observed that the chemical starts evaporated over the fabric due to high concentration of temperature occurs.

#### 3) Boil at 60°C

The analysis test were done at the sample size from 200 micrometers to 5 micrometers at average width of 10 mm and it is observed that the chemical content is sedimented on the fabric completely but it is observed that the chemical starts evaporated over the fabric due to high concentration of temperature.

#### 4) Pad sudden

The analysis test were done at the sample size from 200 micrometers to 5 micrometers at average width of 10 mm and it is observed that the chemical content is sedimented on the fabric completely and provides better results.

#### 5) Pad at 5 mins

The analysis test were done at the sample size from 200 micrometers to 5 micrometers at average width of 10 mm and it is observed that the chemical content is sedimented on the fabric completely but it is observed that the chemical starts evaporated over the fabric due to high concentration of time occurs.

#### 6) Pad at 10 mins

The analysis test were done at the sample size from 200 micrometers to 5 micrometers at average width of 10 mm and it is observed that the chemical content is sedimented on the fabric completely but it is observed that the chemical starts evaporated over the fabric due to high concentration of time

occurs.

## 6. Conclusion

The examinations and tests performed show that the modification of cotton fabrics with ECHOZAN solution makes it possible to obtain antiviral effects as expected. The treatment of the Echozan-bk with the cotton fabric clearly explains that the sedimentation of the chemical on the fabric looks outstanding on the test results, but the FTIR and SEM analysis clearly shows us if the Temperature and the time rises the chemical content settles in the fabrics started to evaporate, so the treatment of the fabric with less temperature and time gives us the best results. This formulation may be used not only in medical applications but also for manufacturing textile products of daily use and technical textiles. In the future, newly developed Antiviral textiles are recommended for use in the health care, work/uniforms, home fashions and domestic products, and sports apparel. With these new technologies, the growing needs of the consumer in antiviral textile related to safety, human health, and environment are fulfilled.

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