

# Skincare Finishing Agent Based on Chitosan/ Silk protein

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### 1. INTRODUCTION

Chitosan has strong inhibition to many bacteria, such as staphylococcus aureus and escherichia coli [1-2]. Silk fibroin is the high purity natural protein of silk purification, which is rich in protein, moreover, there are 18 kinds of amino acids in the silk fibroin. Among them, leucine is able to accelerate the metabolism of cells; meanwhile, serine and threonine could delay the ageing of the skin [3-4].

In this experiment, we pretreated the cotton fabrics with biological enzyme process to endue the fabrics with soft handle.

### 2. EXPERIMENTAL

#### 2.1 materials and agents

Chitosan (deacelation rate > 97%) supplied by Dalian XinDie chitin Co., Ltd (China) was used. Protein (purity > 98%) was provided by Huzhou Dalixin Co., Ltd (China).

#### 2.2 treatment process

Degradated chitosan was blended together with protein to be prepared as the finishing solution. Then the pretreated fabric was dipped in the chitosan/silk protein solution above, to be continued, the fabric was dried and tested for moisturizing, antibacterial and softness performance.

#### 2.3 influence factorial analysis

#### 2.4 test

### 3. RESULTS AND DISCUSSION

#### 3.1 effect of chitosan/protein proportion on fabric hydroscopic property

The fully wetting time for the fabrics after finishing was shown in fig. 1.

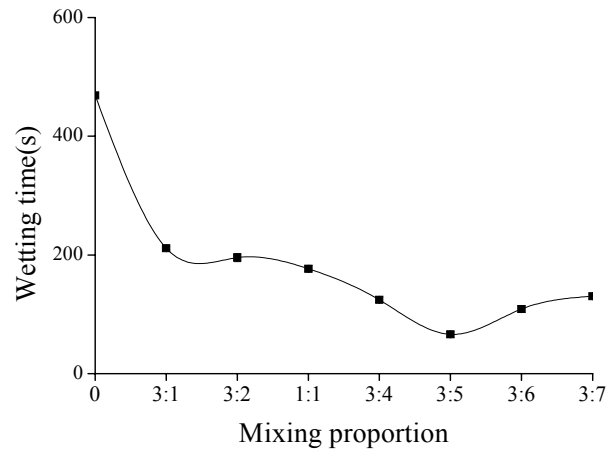


Fig. 1. Relationship between chitosan/ protein mixing proportion and wetting time.

#### 3.2 effect of chitosan/silk protein proportion on fabric bacterial inhibition

Table 1 is the bacterial inhibition data of the fabric finished with chitosan/silk protein solution for three strains of bacteria.

#### 3.3. effect of drying temperature on the fabric stiffness

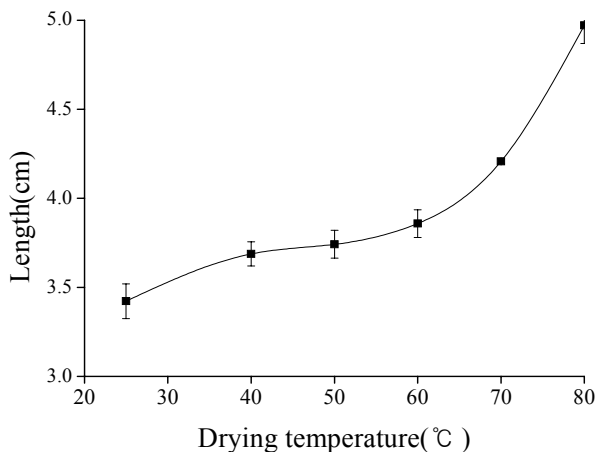
As it expressed in fig. 2, with the increasing of the drying temperature, the curve rose gradually but the general trend was relatively slow, when the drying temperature was 80°C, the length of the bending fabric increased from the initial 3.5 cm to 4.94 cm, which explained that the fabric stiffness increased with the drying temperature increasing proportional.

#### 3.4 antimicrobial test for fabrics after washing

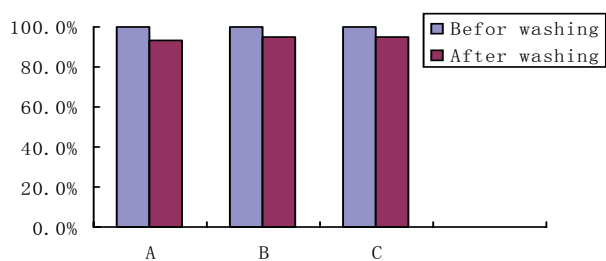
After washing for 10 times, antibiosis rate for staphylococcus aureus, *k pnemmoniae*, candida albicans declined from 99.8% , 99.6%, 99.9% before washing to 93.7%, 94.8%, 95% after washing respectively, but the downtrend was not evident.

Table 1. Bacterial inhibition for treated fabric after finishing

strain	3:0		3:1		3:2		3:3		2:3		1:3		0:3	
	proportion	S.D.	proportion	S.D.	proportion	S.D.	proportion	S.D.	proportion	S.D.	proportion	S.D.	proportion	S.D.
Staphylococcus aureus	96.5	0.54	92.7	0.07	90.5	0.21	88.2	0.40	50.3	0.40	27.1	0.37	24.7	0.39
<i>Klebsiella pnemmoniae</i>	95.3	0.45	95.1	0.25	90.3	0.18	85.6	0.33	43.7	0.13	24.6	0.53	22.4	0.46
Candida albicans	95.2	0.61	94.8	0.15	90.1	0.15	84.7	0.46	43.3	0.37	26.1	0.22	20.7	0.08



**Fig. 2.** Relationship between drying temperature and length



A: *Staphylococcus aureus* B: *Klebsiella pneumoniae*  
C: *Candida albicans*.

**Fig. 3.** Antimicrobial of fabrics after washing for 10 times.

#### 4. CONCLUSION

- (1) Bacterial reduction rate for *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Candida albicans* of the fabric finished with chitosan/ protein finishing agent was 99.8%, 99.6%, 99.9% respectively, also, good moisture retention was obtained.
- (2) The cotton fabric finished with chitosan/protein finishing agent can still keep good antibacterial and moisture retention after washing for many times.

#### 5. REFERENCES

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