

Effect of Optim 1 on Tensile Properties of Dental Chair Fabrics

Purpose:

1. To evaluate long-term interaction between common dental chair fabrics and **Optim 1** surface disinfectant used to clean environmental surfaces;
2. To investigate the effect of **Optim 1** surface disinfectant on both visual appearance and tensile properties of dental chair fabric.

Experimental Design:

Ultraleather (*Ultrafabrics*), a dental chair fabric, was cut into 4.25 x 5.75" swatches. Test swatches were fastened with a specimen holder to the platform of an automated wiper - *SDL Atlas electronic crockmeter** (Figure 1). An experimental surface disinfectant wipe, **Optim 1** (*SciCan*) was clipped onto the rubbing finger located at the base of the arm. Swatches were wiped (1 wipe = back and forth) 10,400 times representing 5 years of use (8 wipes a day, 5 days a week, for 52 weeks = 2,080 wipes/year). Surface disinfectant wipes were changed every 200 wipes to ensure that wipes did not dry out during testing. Following the wiping regimen, swatches were set out to dry at room temperature for at least 24 hours prior to analysis. Swatches were then photographed and analyzed for visual disparities in color and texture. Subsequently, tensile strength samples were punched out using a certified hourglass specimen die (ASTM D412 die, Pioneer-Dietecs). Test fabrics consisted of two material layers, a synthetic leather or vinyl top layer and a tightly woven threaded backside. Newly cut hourglass samples left the ends with unfastened threads that when stretched for tensile strength testing caused individual threads to be pulled through the woven structure causing the sample to perform in an unnatural way. To correct this, two layers of rubber cement were added to the ends of the hourglass specimens and then allowed to dry prior to testing. Completed upholstery test specimens underwent tensile strength testing, using an *Instron 5866* to measure the ultimate tensile strength (load) and extension of the testing material (Figure 2). (n = 8)**

**SDL Atlas electronic crockmeter* is a piece of instrumentation certified for use in standardized testing methods for colorfastness of textiles. It was designed to simulate the action of a human finger and forearm using a standardized pressure and motion to provide reliable and reproducible test results.



Figure 1: SDL Atlas Electronic Crockmeter

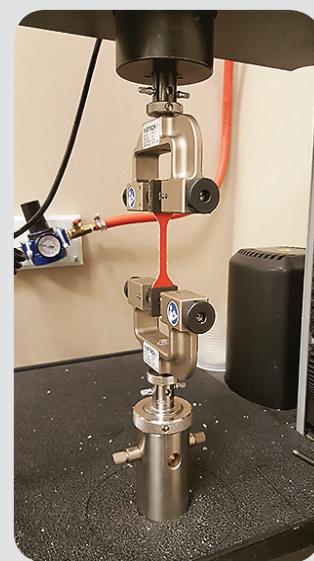


Figure 2. Tensile strength testing with *Instron 5866*

Results:

Visual Analysis

Following extended exposure to *Optim 1* surface disinfectant wipes, *Ultraleather* test upholstery demonstrated no visual change in appearance, even at a microscopic level (Figure 3a,b). The observed visual changes were not a predictor of how long-term exposure affected the tensile properties of the test fabrics.

Tensile Strength

Overall *Ultraleather* test upholstery retained tensile properties seen with untreated samples (control) showing no major differences in tensile load or extension (Table 1). Means and standard deviations of load (N) and extension (mm) are listed in Table 1.

Figure 3a and b: Microscopic view of a) treated *Ultraleather*, and b) untreated.

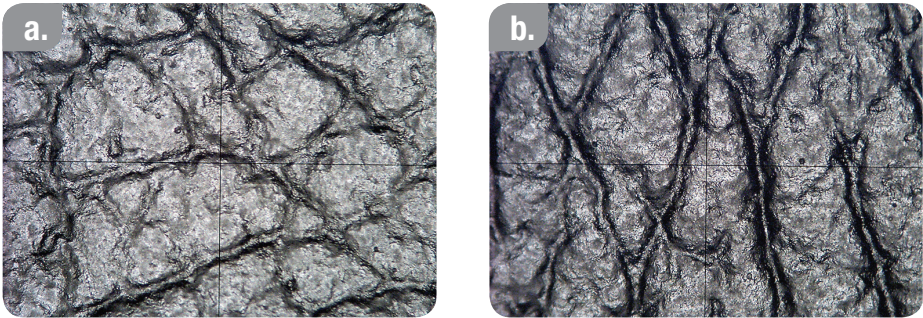


Table 1: Tensile strength results*** for fabric exposed to *Optim 1*.

Fabric	Disinfectant	Load (N)	Extension (mm)
Ultraleather	Control	59.8(6.5) ^a	168.1(20.3) ^b
	Optim 1	52.9(9.1) ^a	171.3(19.3) ^b

***Means with standard deviations in parenthesis. Means with the same superscript letters are statistically the same at the 0.05 level of significance.

Conclusion:

This study examined the effects caused by the extended (an accelerated 5-year aging) interaction between *Ultraleather* dental chair upholstery and *Scican* surface disinfectant *Optim 1*. After treatment, *Ultraleather* remained visibly unchanged. Effects on tensile strength were minor and not statistically significant.

**The test method used was not able to incorporate the manufacturer’s instructions to let upholstery air-dry after each application, and to rinse and dry the surface at least weekly.