

BEZAKTIV FX

ILLUSTRATIONS OF DISCHARGEABILITY
TO POTASSIUM PERMANGANATE

1. Introduction

BEZAKTIV FX dyes are selected reactive dyes for RFD (ready for dyeing) garments made of cellulose, cellulose regenerated fibers and their blends. Most of the BEZAKTIV FX elements can be used for subsequent fashionable bleach treatments.

Local bleach treatments with spray gun or paintbrush and/or superficial all-over bleach treatments using random- (blanket-, stracci-), acid- (moon-, marble-, snow-) and fog-technique lead to authentic used and old looks of the garments. Potassium permanganate can be used for all techniques except fog-treatment. This brochure shows the sensitivity of each BEZAKTIV FX dye to several concentrations of potassium permanganate.

The illustrated bleaching tests were made by applying the bleach solution superficially with a inox spray gun. For the illustrations 2 until 6, the bleach solution was sprayed in a garment-finishing typical way, using 2 moves. The nozzle of the spray gun was therefore opened only slightly and the airflow greatly reduced.

Important

Please note that most aerosols are considered hazardous to health when inhaled. Contact with eyes, mucous membranes and the skin must be avoided. We strongly advise you to use optimal personal protective equipment (protective mask, suit and gloves) to safeguard workers. A professional spray booth with strong air exhaustion is a basic requirement. Please observe the regulations of your country for spraying aerosols.

If random-bleach, aid-wash or fog-bleach are used, the discoloring effect is usually stronger due to repeated application at the exposed fabric surface. To simulate this kind of bleaching method, we show in illustration 1 the result of a repeated spraying. The test as shown in illustration 3 was repeated 3 times. Inbetween each step the sprayed sample was left 15 min. to react and dry.

Strong bleaching solutions combined with high quantities of acid may attack besides dyes as well cellulose. Therefore we recommend to always carry out preliminary tests.

2. The potassium permanganate (KMnO₄) bleach system

Still the most commonly used bleaching system worldwide although it is particularly dangerous to health and environment and highly fish toxic. The main focus of the CHT Group is on the organIQ BLEACH system. It is the first purely organic and completely degradable bleaching agent for denim and BEZAKTIV FX dyed fabrics. In most countries the use of potassium permanganate is controlled and regulated through authorities. Sometimes it is even not officially available. Due to its specific purple color an optical control of local bleach application is easy. The achievable discoloring effect is significantly increased when phosphoric acid (H₃PO₄) is added to the potassium permanganate solution. The reason is, that during its reaction in acidic pH ($\text{MnO}_4^- + 5 e^- + 8 \text{H}^+ \rightarrow \text{Mn}^{2+} + 4 \text{H}_2\text{O}$) KMnO₄ is releasing 5 electrons, and in a neutral pH ($\text{MnO}_4^- + 3 e^- + 4 \text{H}^+ \rightarrow \text{MnO}_2 + 2 \text{H}_2\text{O}$) only 3 electrons are released. For complete conversion and thus to fully exploit the oxidizing power of KMnO₄ per mole KMnO₄, the stoichiometric amount of 8 moles of hydroxene ions (protons) is necessary.

1 g of KMnO₄ requires 1.94 g or 1.14 ml/l of H₃PO₄ 85 %.

Not all dyes require the useage of H₃PO₄. Pure Indigo, some direct and some BEZAKTIV FX dyes can be discharged completely without it. Therefore we illustrate in this brochure as well the dischargeability with 30 g/l KMnO₄ in neutral pH. Nevertheless using H₃PO₄ helps reducing the necessary amount of KMnO₄ significantly.

		Illustration 1	Illustration 2	Illustration 3	Illustration 4	Illustration 5	Illustration 6
KMnO ₄	g/l	30	50	30	30	12	4
H ₃ PO ₄ 85 %	ml/l	34	57	34	-	14	4,6
Repeated application		3 times	-	-	-	-	-

Depending on the room temperature a development time of 15 – 60 min is needed. To neutralise the converted permanganate, a neutralisation bath is needed. We recommend therefore the biodegradable organIQ NEUTRAL. To remove the destroyed (sometimes only partially) dyestuff chromophores, including any possible released heavy metal ions from metal-complex dyes, it is highly recommended to carry out 1 – 2 bathes with a strong sequestering agent:

Neutralisation

0.5 – 2.0 g/l organIQ NEUTRAL (pH 4.5)
2.0 g/l DENIMCOL DIS-NWS or DENIMCOL DIS-SF4
15 min at 40 – 50 °C

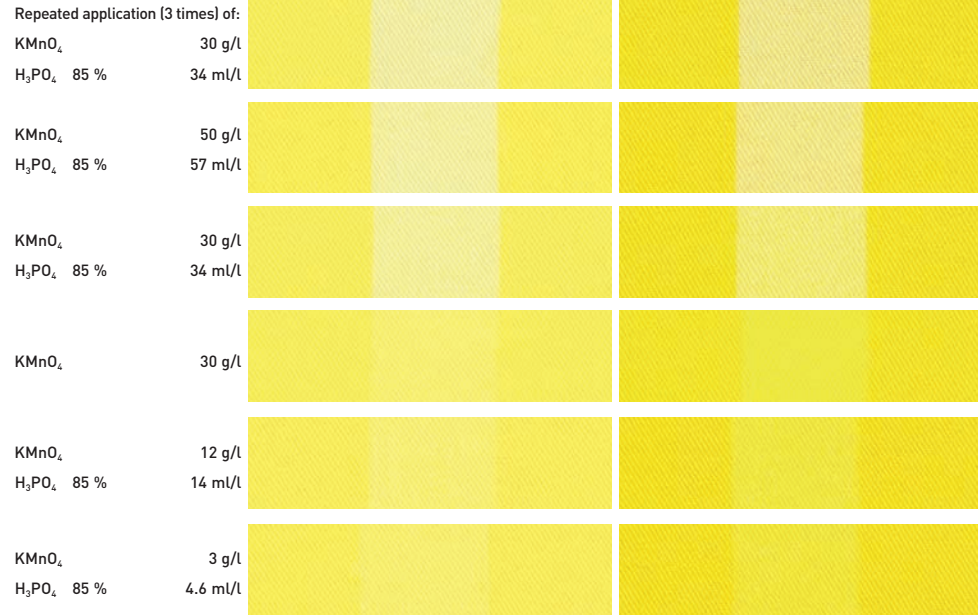
Additional washing process (only for dark shades)

2.0 g/l DENIMCOL DIS-NWS or DENIMCOL DIS-SF4
10 min at 50 – 70 °C
Enclosed rinsing cold

Depending on dyestuff combination and concentration it is sometimes helpful to carry out an additional reductive neutralisation step with sodium disulfite to obtain a better white discharge.

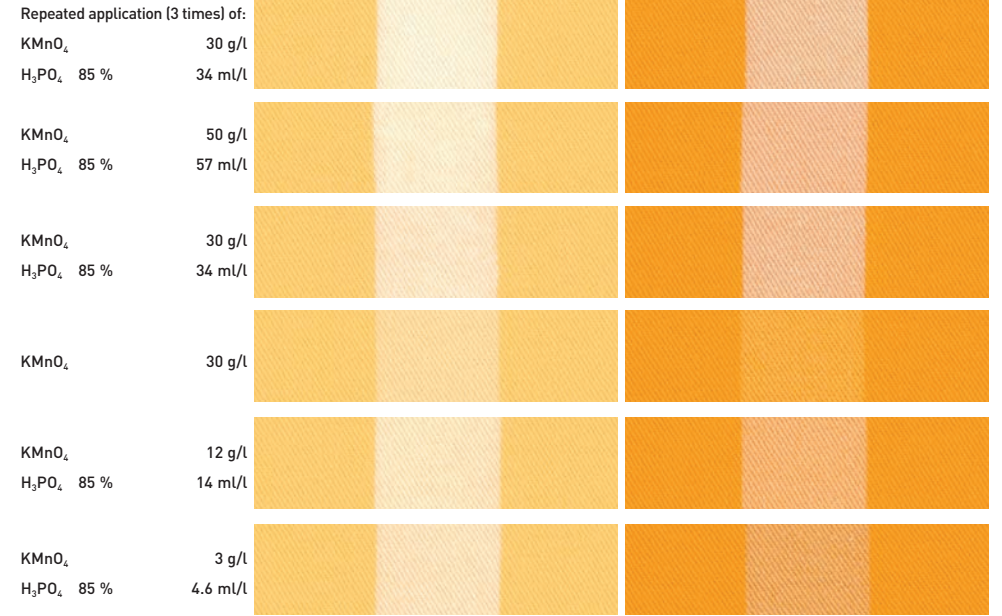
BEZAKTIV Yellow FX-7G 0.83 % [1/6 SD]

BEZAKTIV Yellow FX-7G 5.00 % [1/1 SD]



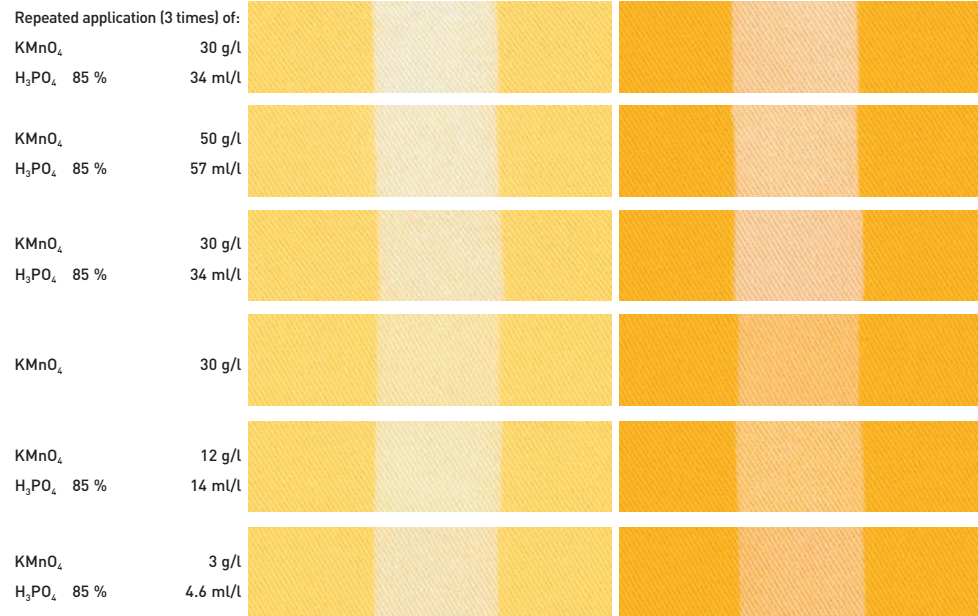
BEZAKTIV Yellow FX-RR 0.50 % [1/6 SD]

BEZAKTIV Yellow FX-RR 3.00 % [1/1 SD]



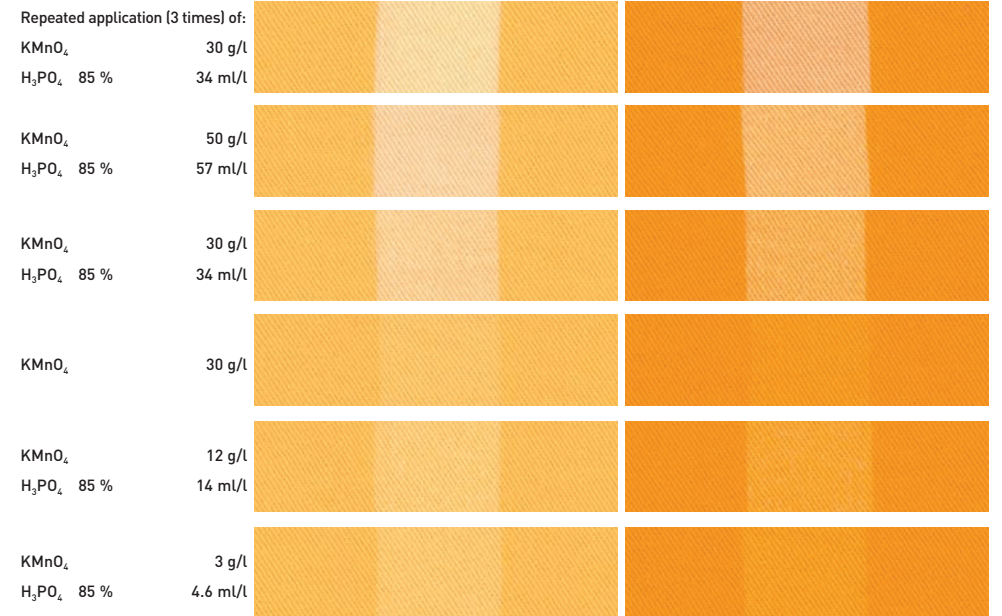
BEZAKTIV Yellow FX-NF 0.33 % [1/6 SD]

BEZAKTIV Yellow FX-NF 2.00 % [1/1 SD]



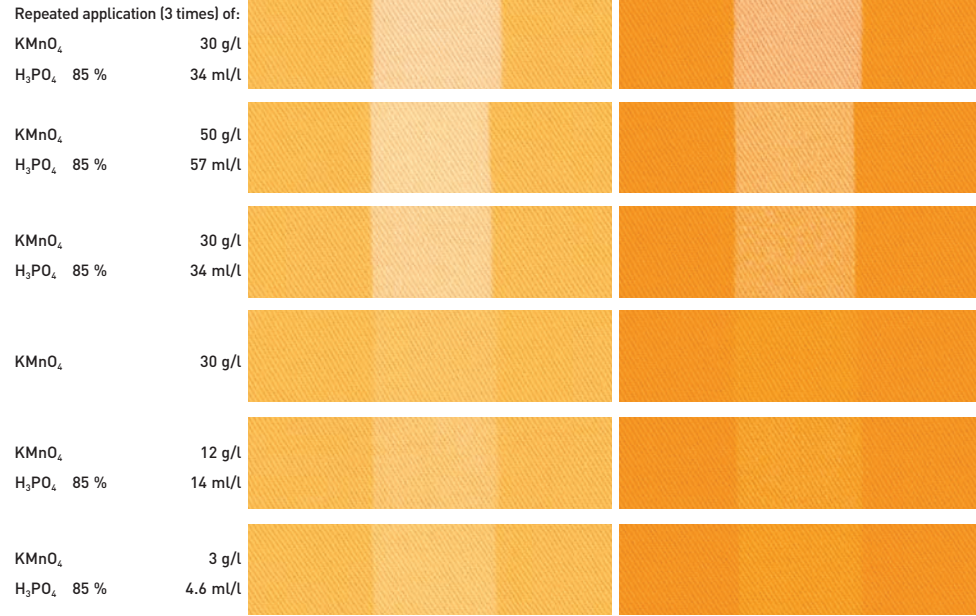
BEZAKTIV Yellow FX-DL 0.40 % [1/6 SD]

BEZAKTIV Yellow FX-DL 2.40 % [1/1 SD]



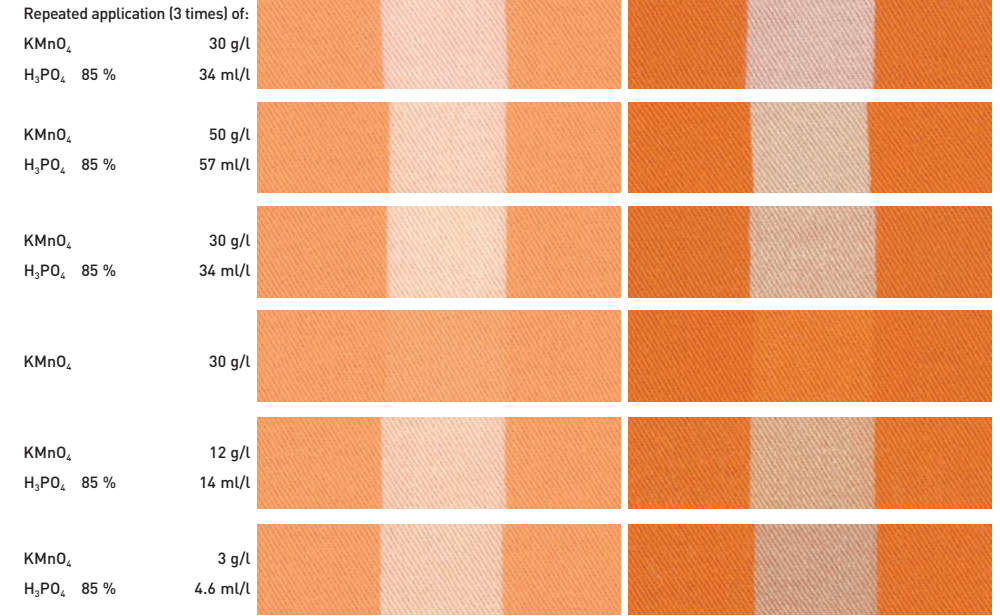
BEZAKTIV Yellow FX-CO 0.42 % [1/6 SD]

BEZAKTIV Yellow FX-CO 2.50 % [1/1 SD]



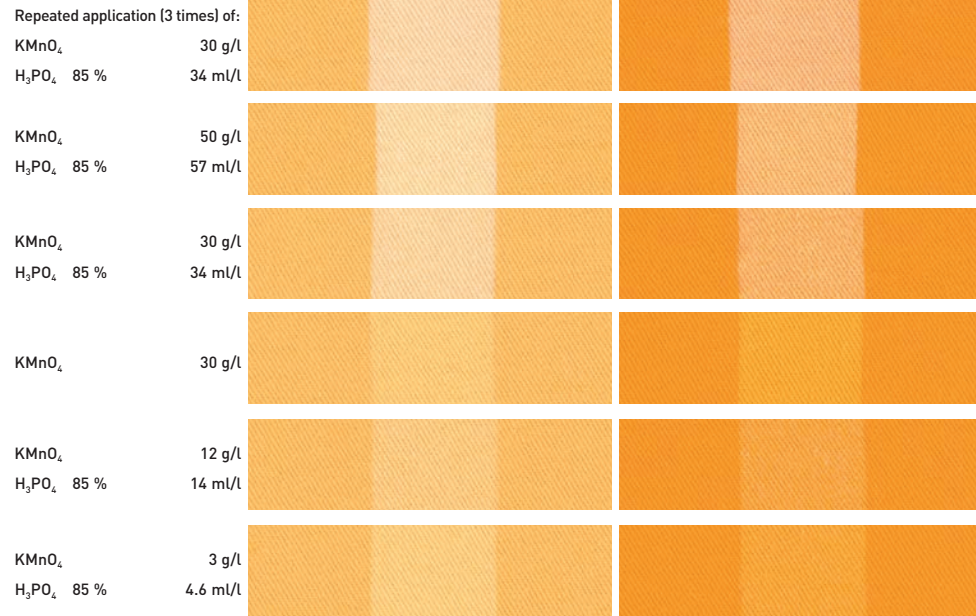
BEZAKTIV Orange FX-TH 0.33 % [1/6 SD]

BEZAKTIV Orange FX-TH 2.00 % [1/1 SD]



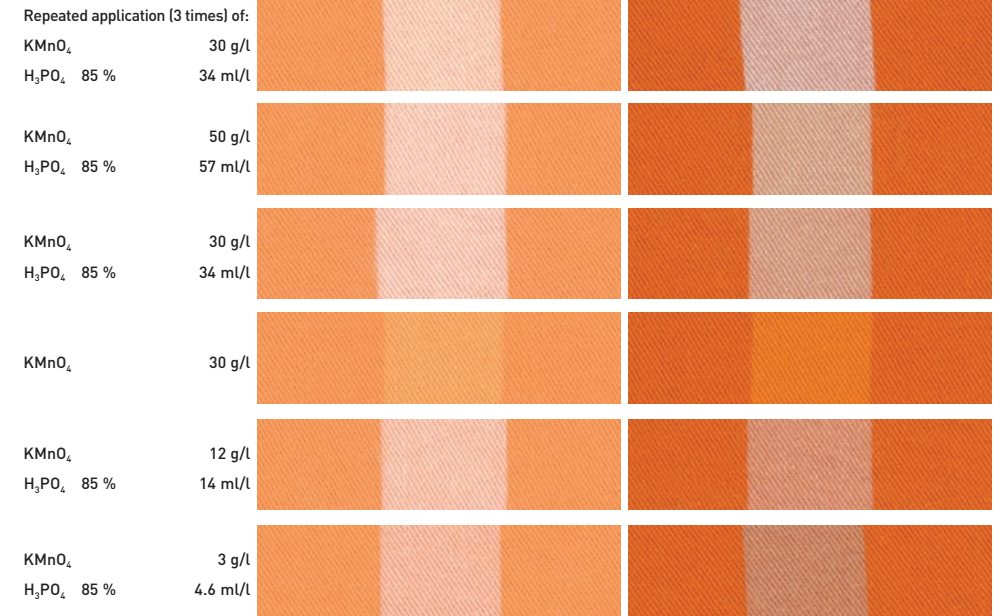
BEZAKTIV Yellow FX-MX 0.33 % [1/6 SD]

BEZAKTIV Yellow FX-MX 2.00 % [1/1 SD]



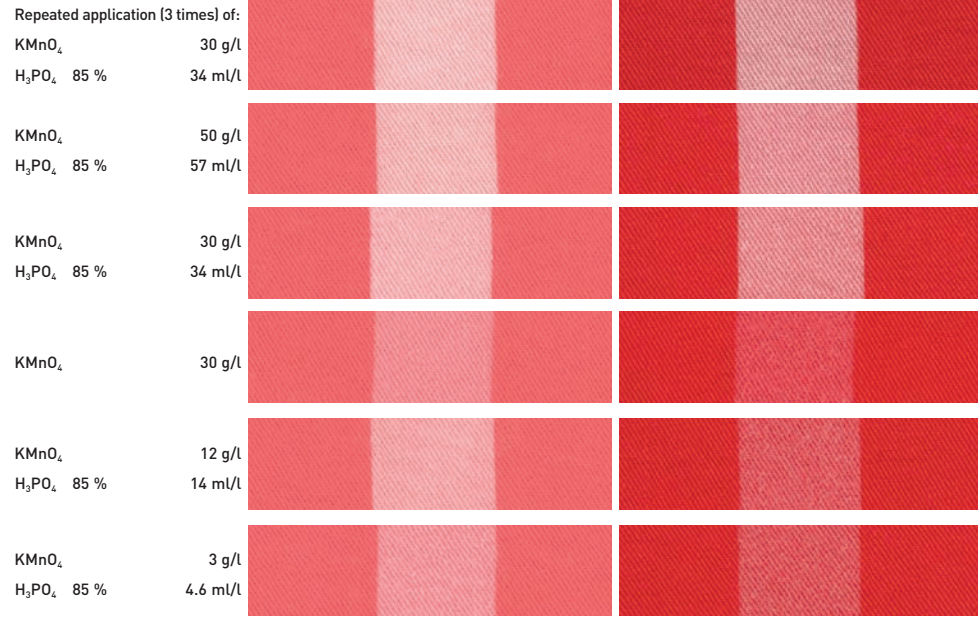
BEZAKTIV Orange FX-RS 0.20 % [1/6 SD]

BEZAKTIV Orange FX-RS 1.20 % [1/1 SD]



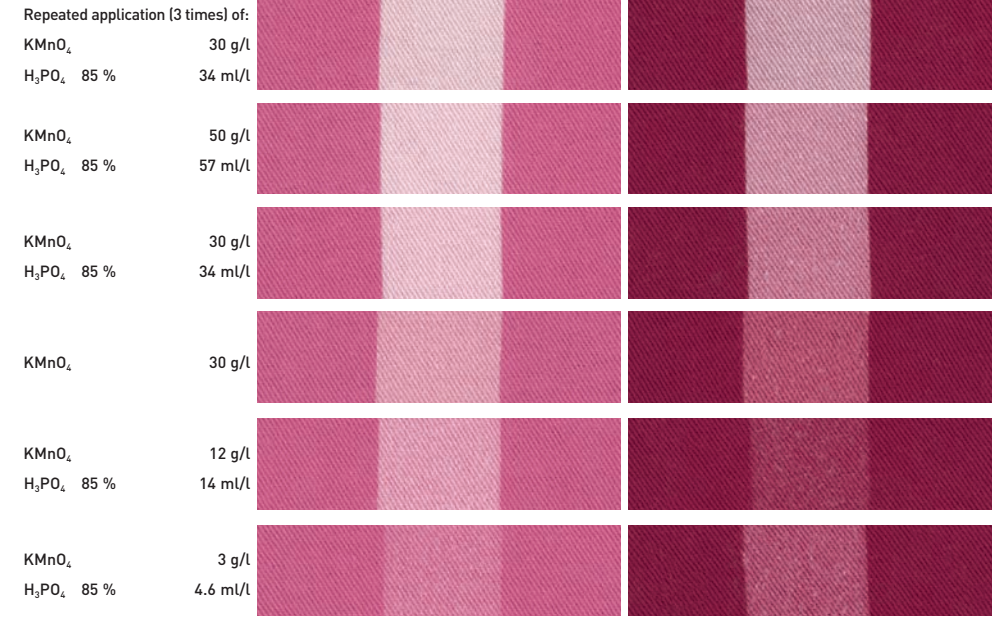
BEZAKTIV Scarlet FX-SB 0.58 % [1/6 SD]

BEZAKTIV Scarlet FX-SB 3.50 % [1/1 SD]



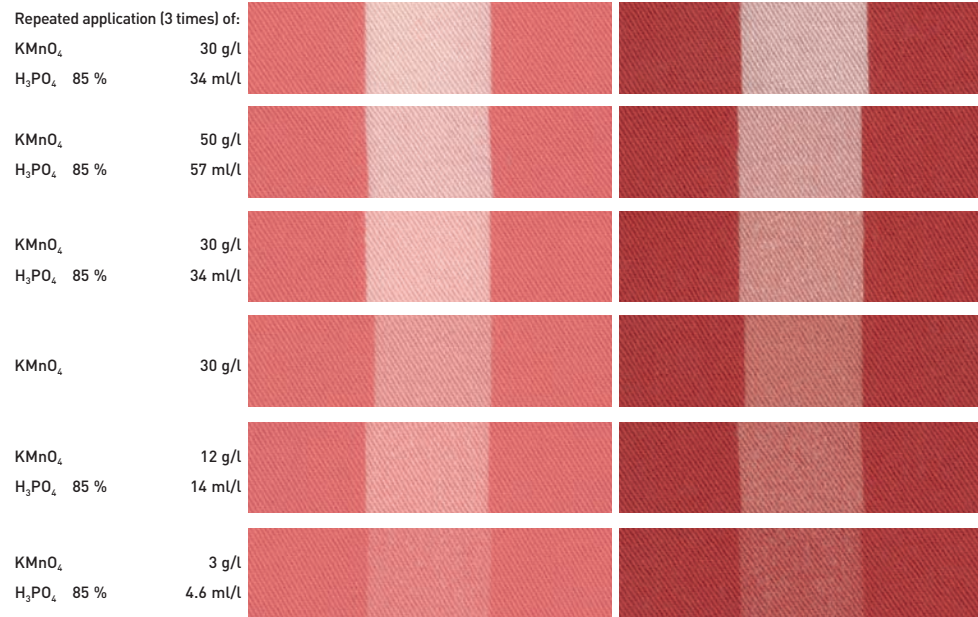
BEZAKTIV Red FX-DC 0.15 % [1/6 SD]

BEZAKTIV Red FX-DC 0.90 % [1/1 SD]



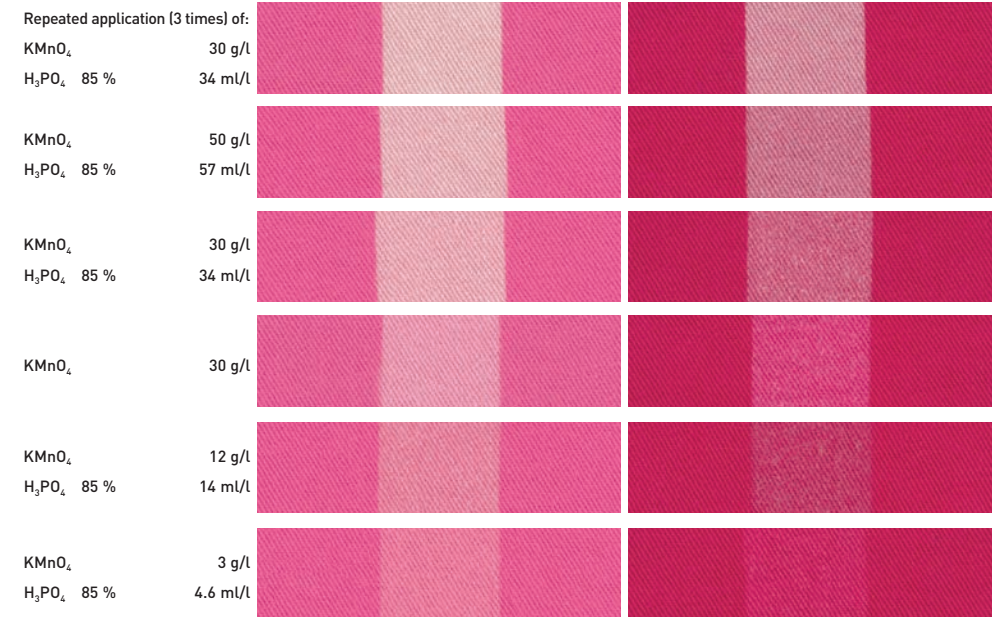
BEZAKTIV Scarlet FX-2D 0.30 % [1/6 SD]

BEZAKTIV Scarlet FX-2D 1.80 % [1/1 SD]



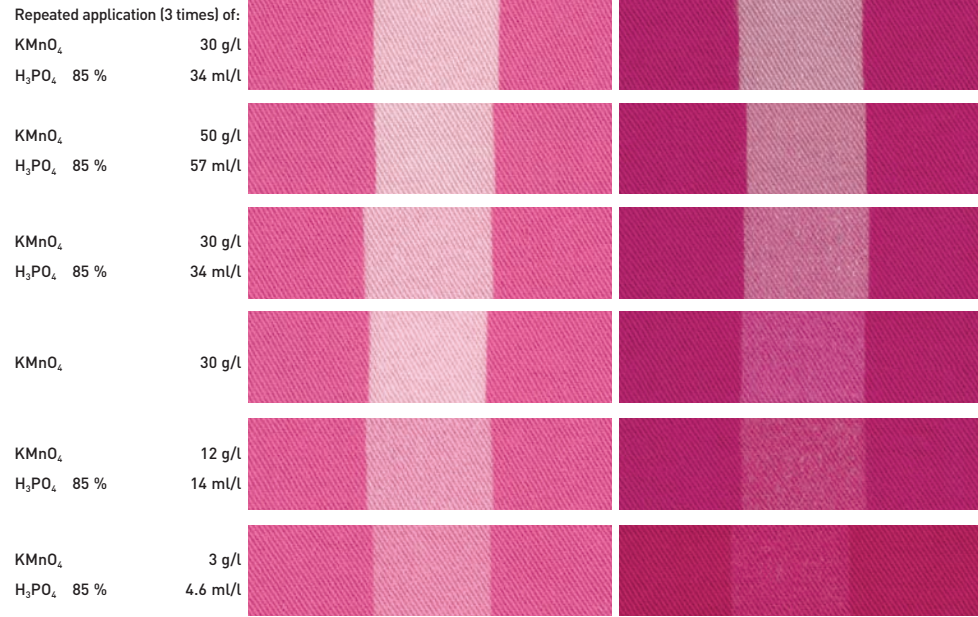
BEZAKTIV Red FX-PL 0.98 % [1/6 SD]

BEZAKTIV Red FX-PL 3.90 % [1/1 SD]



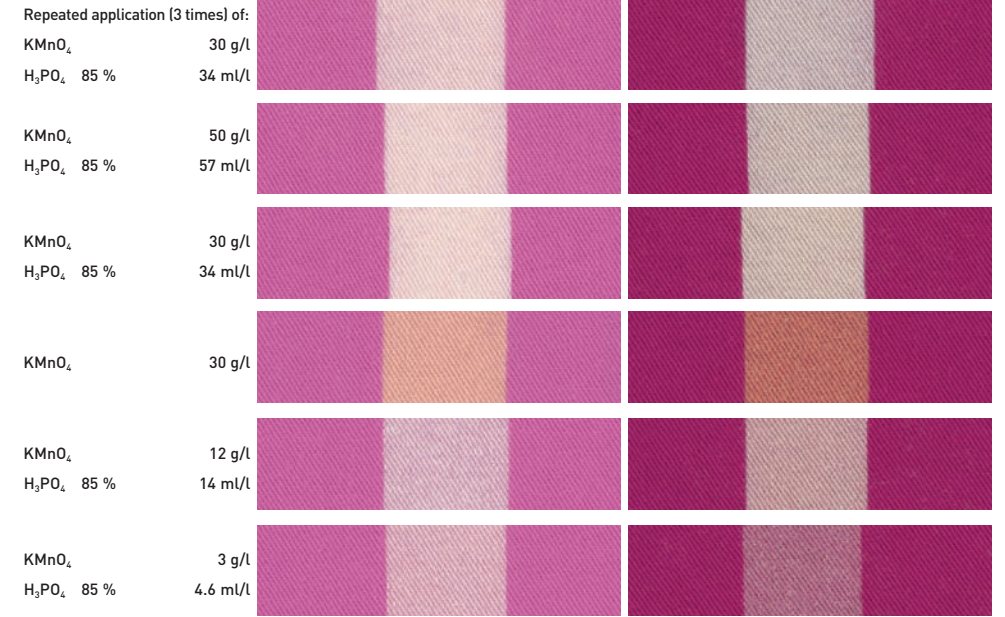
BEZAKTIV Red FX-B 0.40 % (1/6 SD)

BEZAKTIV Red FX-B 2.40 % (1/1 SD)



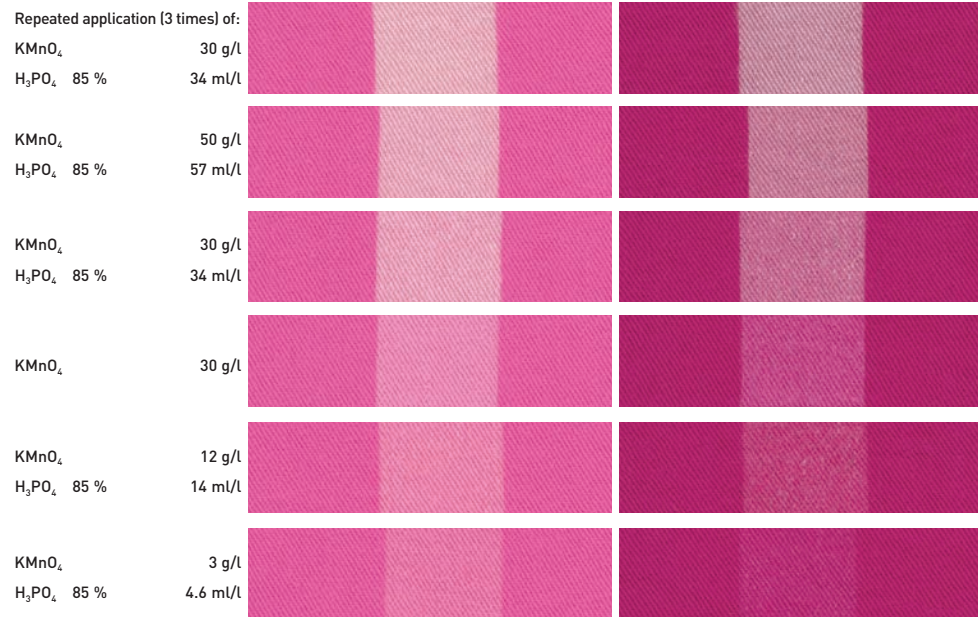
BEZAKTIV Red FX-3D 0.75 % (1/6 SD)

BEZAKTIV Red FX-3D 4.50 % (1/1 SD)



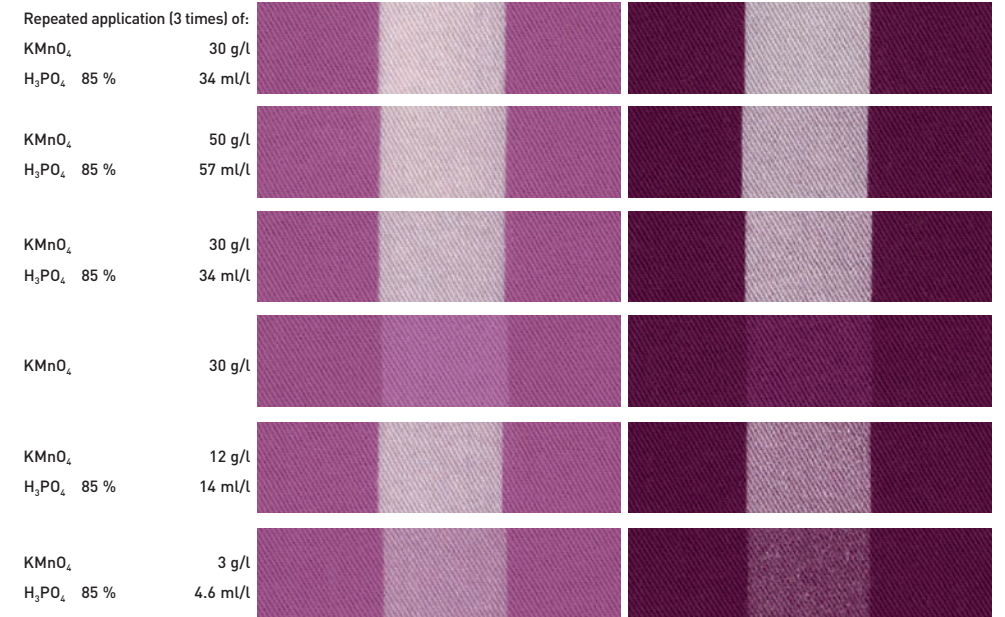
BEZAKTIV Red FX-3B 0.47 % (1/6 SD)

BEZAKTIV Red FX-3B 2.80 % (1/1 SD)



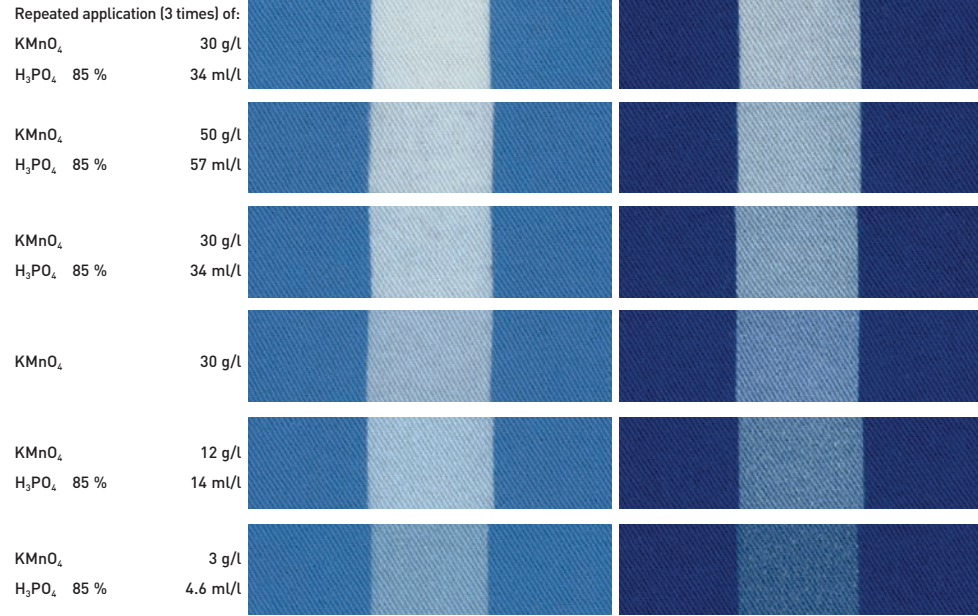
BEZAKTIV Bordeaux FX-2B 0.58 % (1/6 SD)

BEZAKTIV Bordeaux FX-2B 3.50 % (1/1 SD)



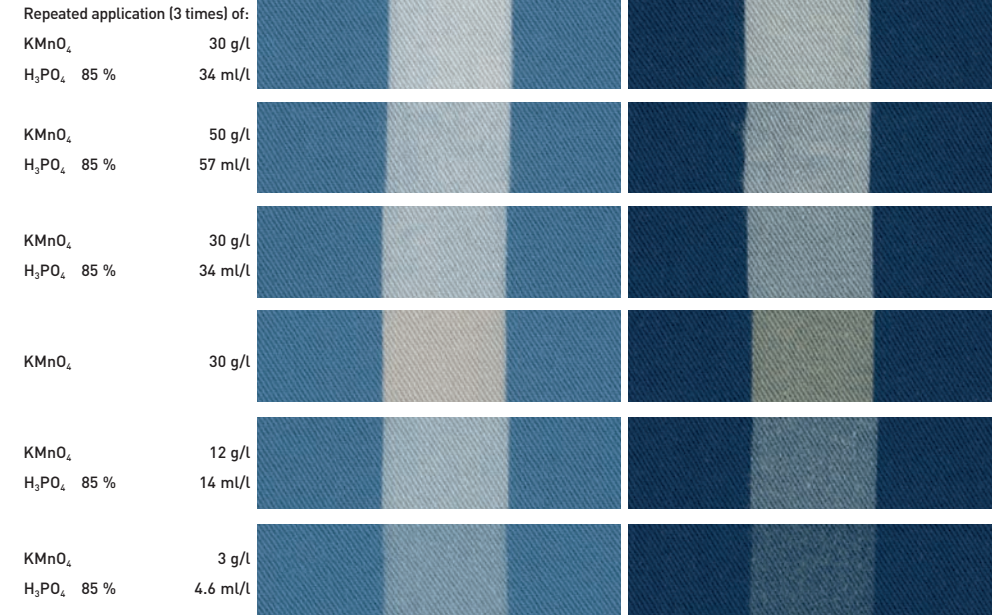
BEZAKTIV Blue FX-RD 0.57 % (1/6 SD)

BEZAKTIV Blue FX-RD 3.40 % (1/1 SD)



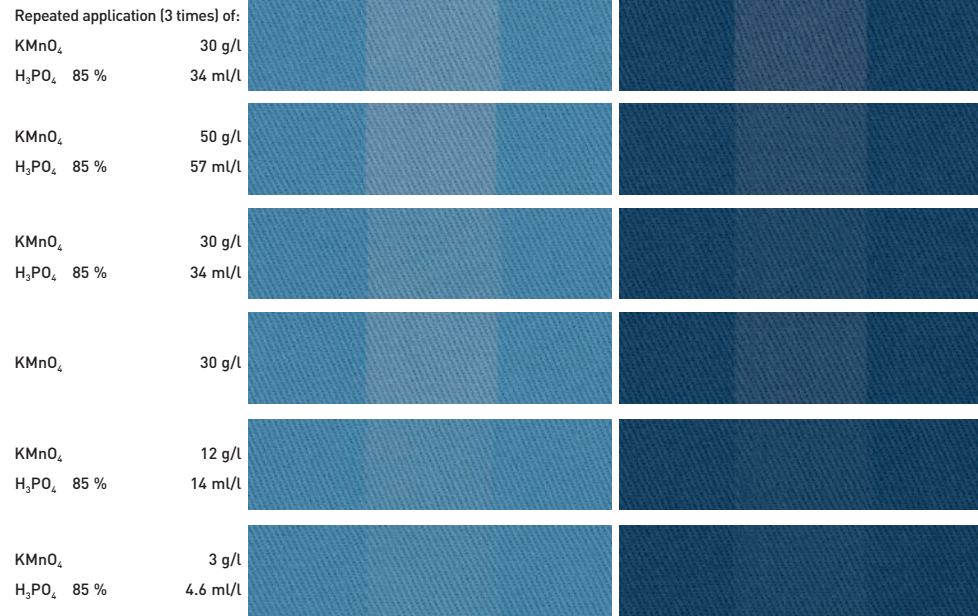
BEZAKTIV Blue FX-NN 01 0.33 % (1/6 SD)

BEZAKTIV Blue FX-NN 01 2.00 % (1/1 SD)



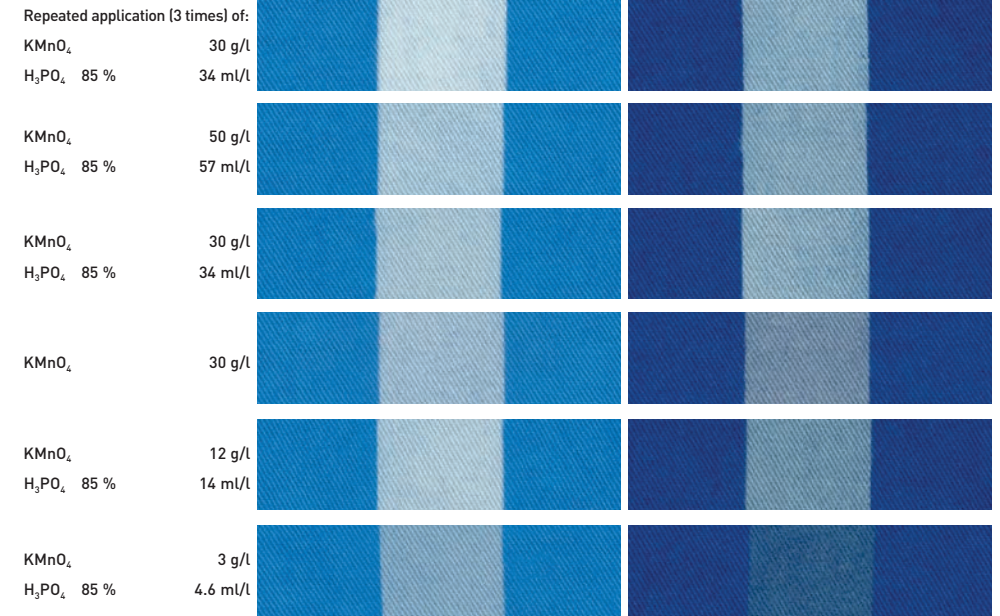
BEZAKTIV Blue FX-ON 0.52 % (1/6 SD)

BEZAKTIV Blue FX-ON 3.10 % (1/1 SD)



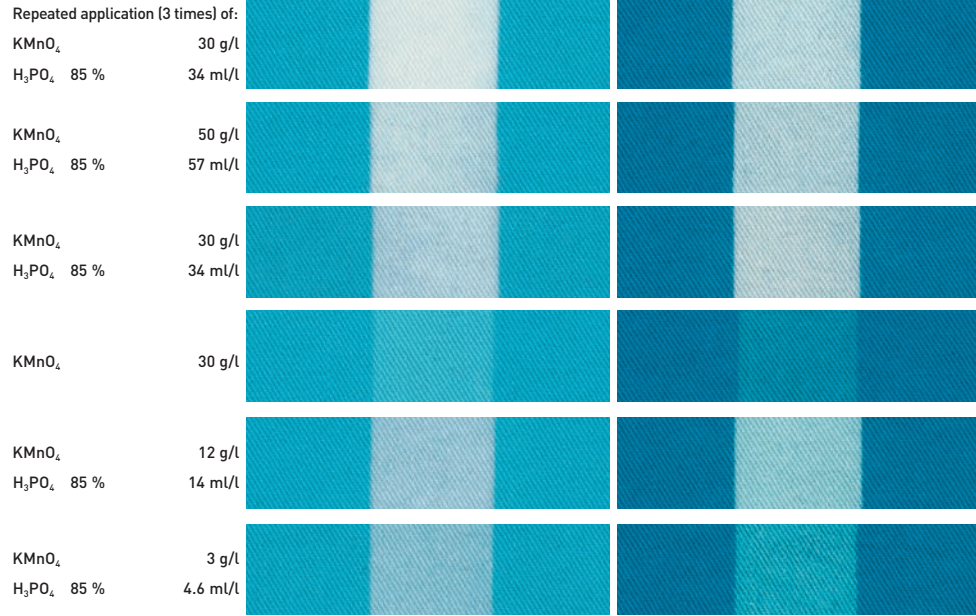
BEZAKTIV Blue FX-GG 0.83 % (1/6 SD)

BEZAKTIV Blue FX-GG 5.00 % (1/1 SD)



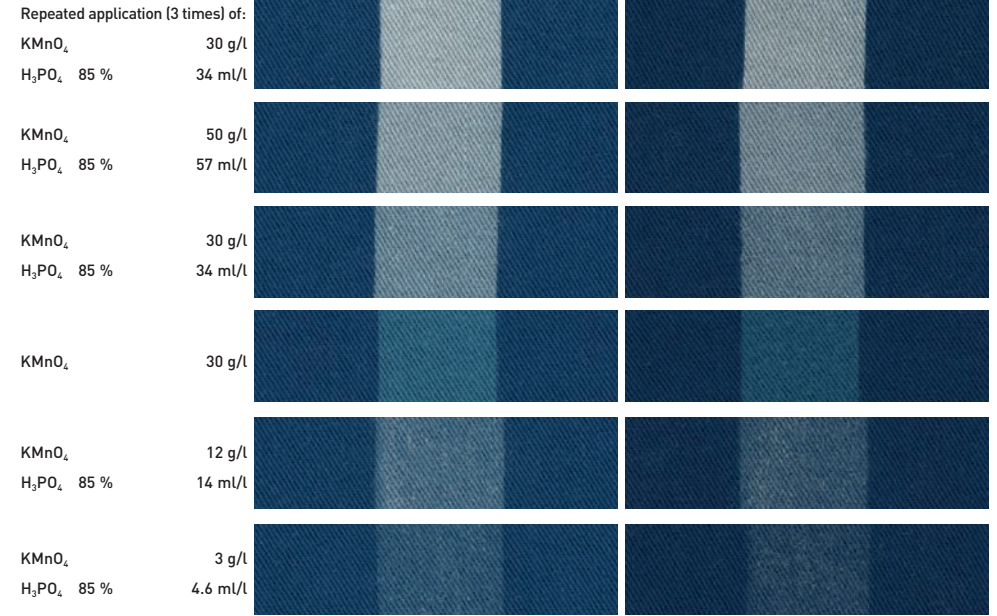
BEZAKTIV Turquoise FX-2G 0.83 % (1/6 SD)

BEZAKTIV Turquoise FX-2G 5.00 % (1/1 SD)



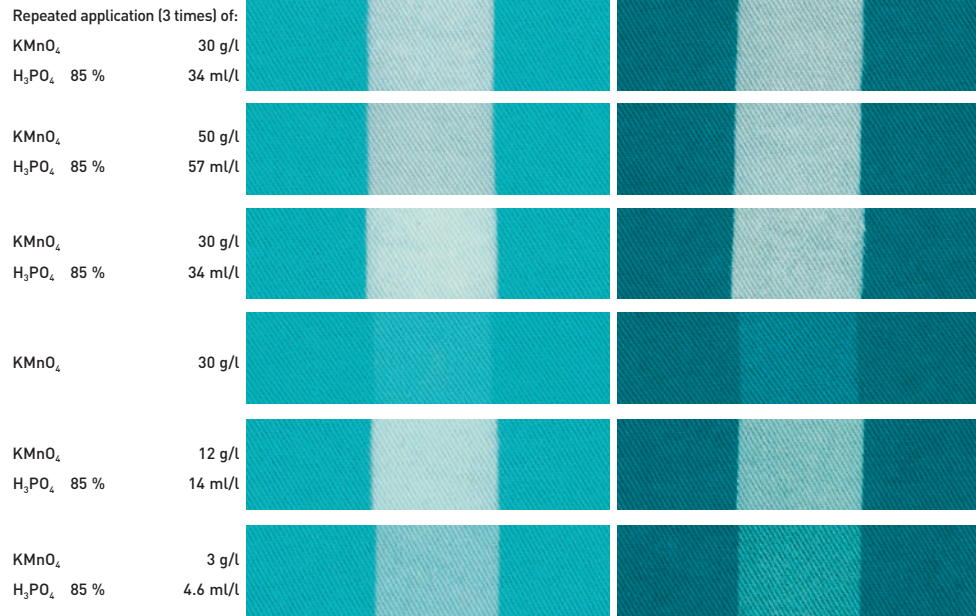
BEZAKTIV Dark Blue FX-5L 2.70 % (1/1 SD)

BEZAKTIV Dark Blue FX-5L 5.40 % (2/1 SD)



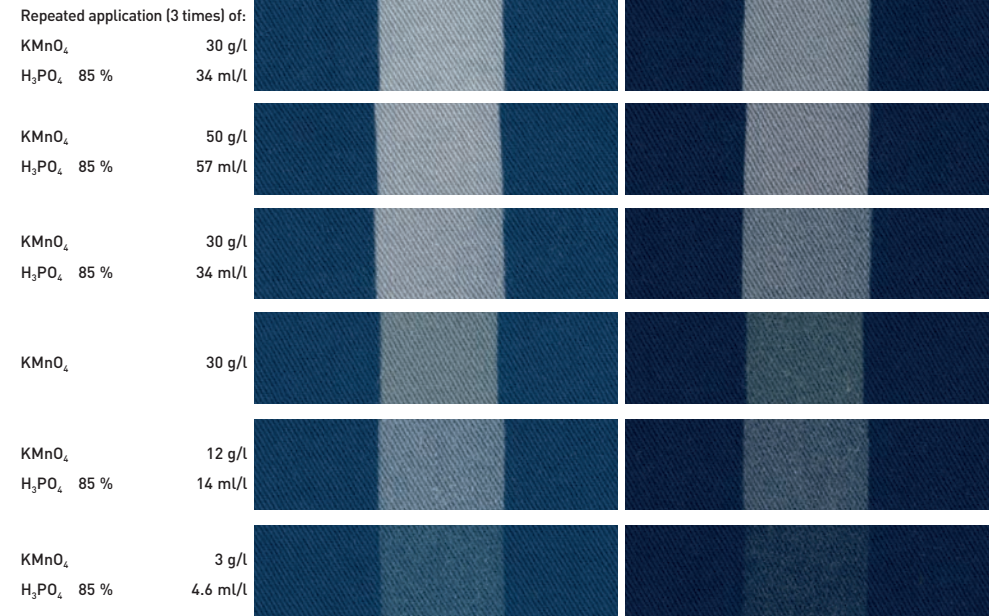
BEZAKTIV Green FX-4B 0.83 % (1/6 SD)

BEZAKTIV Green FX-4B 5.00 % (1/1 SD)



BEZAKTIV Dark Blue FX-WF 2.20 % (1/1 SD)

BEZAKTIV Dark Blue FX-WF 4.40 % (2/1 SD)



BEZAKTIV Navy FX-DN 1.50 % (1/1 SD)

BEZAKTIV Navy FX-DN 3.00 % (2/1 SD)

Repeated application (3 times) of:			
KMnO ₄	30 g/l		
H ₃ PO ₄ 85 %	34 ml/l		
KMnO ₄	50 g/l		
H ₃ PO ₄ 85 %	57 ml/l		
KMnO ₄	30 g/l		
H ₃ PO ₄ 85 %	34 ml/l		
KMnO ₄	30 g/l		
KMnO ₄	12 g/l		
H ₃ PO ₄ 85 %	14 ml/l		
KMnO ₄	3 g/l		
H ₃ PO ₄ 85 %	4.6 ml/l		

BEZAKTIV Navy FX-PS 1.50 % (1/1 SD)

BEZAKTIV Navy FX-PS 3.00 % (2/1 SD)

Repeated application (3 times) of:		
KMnO ₄	30 g/l	
H ₃ PO ₄ 85 %	34 ml/l	
KMnO ₄	50 g/l	
H ₃ PO ₄ 85 %	57 ml/l	
KMnO ₄	30 g/l	
H ₃ PO ₄ 85 %	34 ml/l	
KMnO ₄	30 g/l	
KMnO ₄	12 g/l	
H ₃ PO ₄ 85 %	14 ml/l	
KMnO ₄	3 g/l	
H ₃ PO ₄ 85 %	4.6 ml/l	

BEZAKTIV Navy FX-BR 3.70 % (1/1 SD)

BEZAKTIV Navy FX-BR 7.40 % (2/1 SD)

Repeated application (3 times) of:			
KMnO ₄	30 g/l		
H ₃ PO ₄ 85 %	34 ml/l		
KMnO ₄	50 g/l		
H ₃ PO ₄ 85 %	57 ml/l		
KMnO ₄	30 g/l		
H ₃ PO ₄ 85 %	34 ml/l		
KMnO ₄	30 g/l		
KMnO ₄	12 g/l		
H ₃ PO ₄ 85 %	14 ml/l		
KMnO ₄	3 g/l		
H ₃ PO ₄ 85 %	4.6 ml/l		

BEZAKTIV Brown FX-R 01 0.53 % (1/6 SD)

BEZAKTIV Brown FX-R 01 3.20 % (1/1 SD)

Repeated application (3 times) of:			
KMnO ₄	30 g/l		
H ₃ PO ₄ 85 %	34 ml/l		
KMnO ₄	50 g/l		
H ₃ PO ₄ 85 %	57 ml/l		
KMnO ₄	30 g/l		
H ₃ PO ₄ 85 %	34 ml/l		
KMnO ₄	30 g/l		
KMnO ₄	12 g/l		
H ₃ PO ₄ 85 %	14 ml/l		
KMnO ₄	3 g/l		
H ₃ PO ₄ 85 %	4.6 ml/l		

BEZAKTIV Brown FX-4R 0.57 % (1/6 SD)

BEZAKTIV Brown FX-4R 3.40 % (1/1 SD)

Repeated application (3 times) of:					
KMnO ₄	30 g/l				
H ₃ PO ₄ 85 %	34 ml/l				
KMnO ₄	50 g/l				
H ₃ PO ₄ 85 %	57 ml/l				
KMnO ₄	30 g/l				
H ₃ PO ₄ 85 %	34 ml/l				
KMnO ₄	30 g/l				
KMnO ₄	12 g/l				
H ₃ PO ₄ 85 %	14 ml/l				
KMnO ₄	3 g/l				
H ₃ PO ₄ 85 %	4.6 ml/l				

BEZAKTIV Black FX-5F 1.90 % (1/1 SD)

BEZAKTIV Black FX-5F 5.70 % (3/1 SD)

Repeated application (3 times) of:					
KMnO ₄	30 g/l				
H ₃ PO ₄ 85 %	34 ml/l				
KMnO ₄	50 g/l				
H ₃ PO ₄ 85 %	57 ml/l				
KMnO ₄	30 g/l				
H ₃ PO ₄ 85 %	34 ml/l				
KMnO ₄	30 g/l				
KMnO ₄	12 g/l				
H ₃ PO ₄ 85 %	14 ml/l				
KMnO ₄	3 g/l				
H ₃ PO ₄ 85 %	4.6 ml/l				

BEZAKTIV Grey FX-N 150 0.60 % (1/6 SD)

BEZAKTIV Grey FX-N 150 3.60 % (1/1 SD)

Repeated application (3 times) of:					
KMnO ₄	30 g/l				
H ₃ PO ₄ 85 %	34 ml/l				
KMnO ₄	50 g/l				
H ₃ PO ₄ 85 %	57 ml/l				
KMnO ₄	30 g/l				
H ₃ PO ₄ 85 %	34 ml/l				
KMnO ₄	30 g/l				
KMnO ₄	12 g/l				
H ₃ PO ₄ 85 %	14 ml/l				
KMnO ₄	3 g/l				
H ₃ PO ₄ 85 %	4.6 ml/l				

BEZAKTIV Black FX-SM 2.40 % (1/1 SD)

BEZAKTIV Black FX-SM 7.20 % (3/1 SD)

Repeated application (3 times) of:					
KMnO ₄	30 g/l				
H ₃ PO ₄ 85 %	34 ml/l				
KMnO ₄	50 g/l				
H ₃ PO ₄ 85 %	57 ml/l				
KMnO ₄	30 g/l				
H ₃ PO ₄ 85 %	34 ml/l				
KMnO ₄	30 g/l				
KMnO ₄	12 g/l				
H ₃ PO ₄ 85 %	14 ml/l				
KMnO ₄	3 g/l				
H ₃ PO ₄ 85 %	4.6 ml/l				

BEZAKTIV Black FX-ND 1.70 % (1/1 SD)

BEZAKTIV Black FX-ND 5.10 % (3/1 SD)

Repeated application (3 times) of:	BEZAKTIV Black FX-ND 1.70 % (1/1 SD)	BEZAKTIV Black FX-ND 5.10 % (3/1 SD)
KMnO ₄ 30 g/l H ₃ PO ₄ 85 % 34 ml/l		
KMnO ₄ 50 g/l H ₃ PO ₄ 85 % 57 ml/l		
KMnO ₄ 30 g/l H ₃ PO ₄ 85 % 34 ml/l		
KMnO ₄ 30 g/l		
KMnO ₄ 12 g/l H ₃ PO ₄ 85 % 14 ml/l		
KMnO ₄ 3 g/l H ₃ PO ₄ 85 % 4.6 ml/l		

BEZAKTIV Black FX-IT 1.80 % (1/1 SD)

BEZAKTIV Black FX-IT 5.40 % (3/1 SD)

Repeated application (3 times) of:	BEZAKTIV Black FX-IT 1.80 % (1/1 SD)	BEZAKTIV Black FX-IT 5.40 % (3/1 SD)
KMnO ₄ 30 g/l H ₃ PO ₄ 85 % 34 ml/l		
KMnO ₄ 50 g/l H ₃ PO ₄ 85 % 57 ml/l		
KMnO ₄ 30 g/l H ₃ PO ₄ 85 % 34 ml/l		
KMnO ₄ 30 g/l		
KMnO ₄ 12 g/l H ₃ PO ₄ 85 % 14 ml/l		
KMnO ₄ 3 g/l H ₃ PO ₄ 85 % 4.6 ml/l		

BEZAKTIV Black FX-UB 1.70 % (1/1 SD)

BEZAKTIV Black FX-UB 5.10 % (3/1 SD)

Repeated application (3 times) of:	BEZAKTIV Black FX-UB 1.70 % (1/1 SD)	BEZAKTIV Black FX-UB 5.10 % (3/1 SD)
KMnO ₄ 30 g/l H ₃ PO ₄ 85 % 34 ml/l		
KMnO ₄ 50 g/l H ₃ PO ₄ 85 % 57 ml/l		
KMnO ₄ 30 g/l H ₃ PO ₄ 85 % 34 ml/l		
KMnO ₄ 30 g/l		
KMnO ₄ 12 g/l H ₃ PO ₄ 85 % 14 ml/l		
KMnO ₄ 3 g/l H ₃ PO ₄ 85 % 4.6 ml/l		



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