HUNTSMAN
Enriching lives through innovation

Technical Information

Cellulose exhaust dyeing

NOVACRON® Lemon S-3G reactive dye

Addition to NOVACRON S range / November 2008 / Core Item 0583857

GENERAL

- Bright lemon yellow shade
- Very good washing-off and wet-fastness properties
- Very good multiple washing fastness
- Relatively good light fastness
- Not AOX free

POSITION IN THE RANGE/DESCRIPTION

NOVACRON S

- Basis for brilliant yellow and green shades in combination with Ocean S-R.

USES

- Suitable for dyeing all cellulosic fibers by the exhaust method.
- Recommended procedure: NOVACRON S pocket card 172004

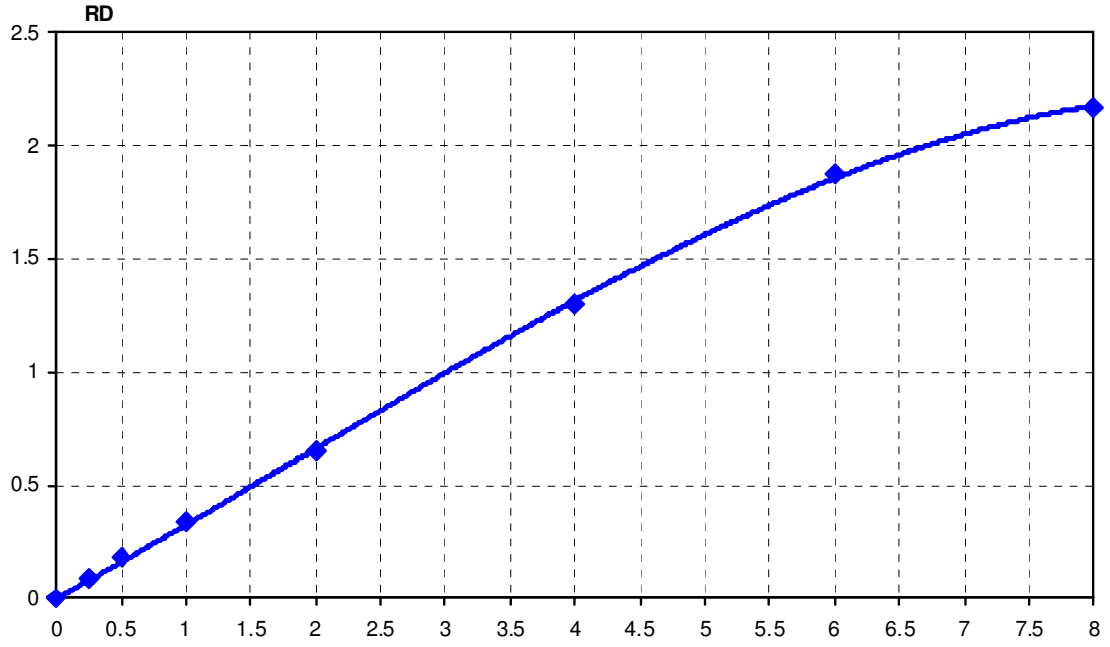
CHARACTERISTICS

CIELab L* / a* / b* at 1 RD	87.5 / -1.1 / 92.4
1 RD on CO tricot n. merc.	3.07%
No. of reactive groups	1
Physical form	powder
Mixture	no
Metal complex	no

Standard depth (SD):	**1/25**	**1/12**	**1/6**	**1/3**	**1/1**	**2/1**
CO tricot n. merc., %	0.14	0.29	0.57	1.15	3.44	6.87
CO cretonne merc., %	0.10	0.21	0.43	0.85	2.56	5.13

Build up on CO tricot n. merc.

Method: 60°C / soda ash
LR: 10:1



Dye %	0.5	1.0	2.0	4.0	6.0	8.0
Reference depth (RD)	0.18	0.34	0.65	1.30	1.87	2.17

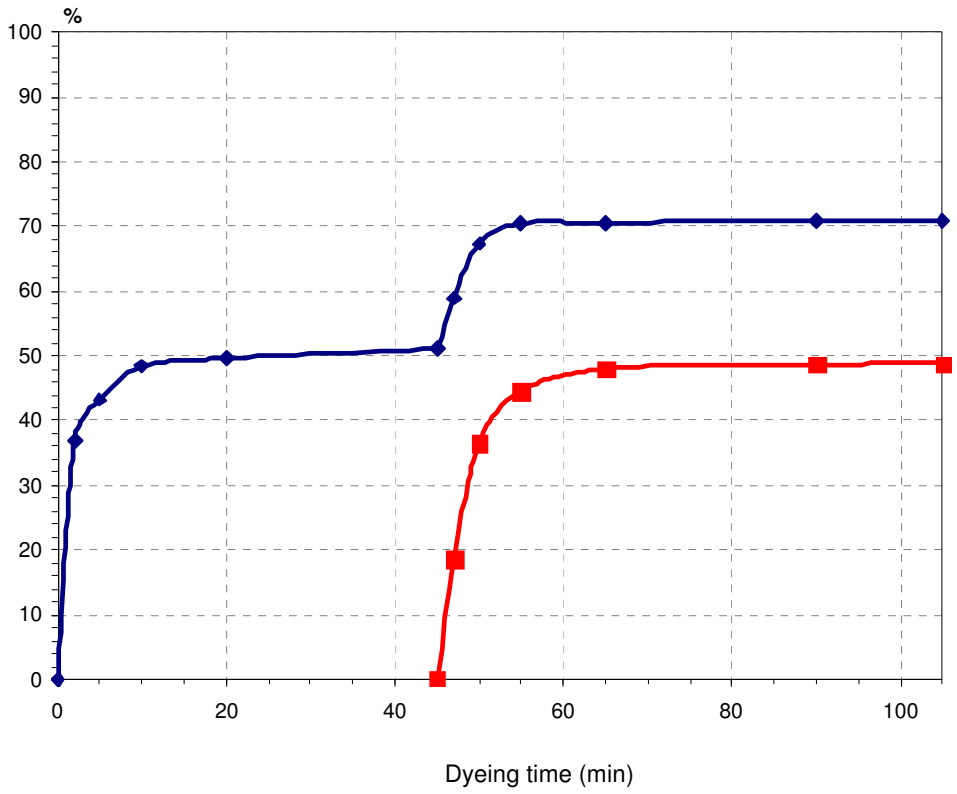
DYEING PROPERTIES

Solubility at 30℃ and 60℃

		Solubility at 30℃/86℉ g/l	Solubility at 60℃/140℉ g/l
Without salt		100	100
Common salt	60 g/l	30	30
Common salt Soda ash	60 g/l 20 g/l	30	30

Exhaustion and fixation curves

Dye conc.	3.07% (1.0 RD)
Fabric	CO tricot n. merc.
Method	NOVACRON S 60℃ isothermal
LR	10:1



DYEING PROPERTIES

Diffusion	Very good
Migration	Very good
Washing off	Very good

Varying dyeing parameters / Influence on yield

Liquor ratio 2% dyeing	10:1 130%	20:1 100%	30:1 90%
Salt addition 2% dyeing	–20% 88%	60 g/l 100%	+20% 105%
Alkali addition 2% dyeing	–20% 97%	14 g/l soda ash 100%	+20% 100%
Fixation temperature 2% dyeing	–10°C 108%	60°C 100%	+10°C 85%
Exhaustion time 2% dyeing	–15 min 100%	45 min 100%	+15 min 100%
Fixation time 2% dyeing	–15 min 100%	45 min 100%	+15 min 100%

Suitability for different materials

Coverage of dead cotton	Very good
Coverage of barry viscose	Very good
Solid shades CO n. merc. / CV (50:50)	100 : 192
Solid shades CO n. merc. / CM (50:50)	100 : 153
Solid shades CO n. merc. / FL (50:50)	100 : 168
Reservation PA (66 Nylon sp.) - staining	3–4
Reservation PA (66 Nylon fi.) - staining	4
Reservation PES (Terylene sp.) - staining	5
Reservation PAC (Orlon 42) - staining	5

DYEING PROPERTIES

Influence of aftertreatment (on 1 SD dyeings)

Aftertreatment	with ALBAFIX	Change	Xenon lamp
15 min / 40 °C / 20:1	without ALBAFIX	–	4
	+1% ALBAFIX ECO	–	4
	+2% ALBAFIX ECO	–	3–4

PES crossdyeing	Conditions	Yield	Shade
60 min at 130 °C with TERASIL dyes	+2 g/l monosodium phosphate, pH 5.5	98%	–

Postbleaching	Conditions	Yield	Shade
20 °C > 95 °C –30 min 95 °C –15 min (instead of soaping)	+2.0 g/l soda ash +3.0 ml/l H_2O_2 35 V% +stabilizer	69%	much redder much brighter

Postmercerizing	Neutralizing	Change	Staining of CO
(ISO 105/X04)	Acetic acid	4–5*	4–5
(ISO 105/X04)	Sulfuric acid	4–5*	4–5
Huntsman TE test	Acetic acid	4–5*	4–5

* darker, deeper

Dischargeability	Neutral	Alkaline
	to 2/1 SD	to 2/1 SD

Stripping	Agents	Method	Suitability
	Hydrosulfite alk.	**A**	recommended
	Hypochlorite	**B**	limited
	Hydrosulfite neutral	**D**	not recommended
	Hydrosulfite alk. + hypochlorite	**AB**	highly recommended
	Hypochlorite + hydrosulfite alk.	**BA**	recommended
	Partial stripping		69%

SENSITIVITIES

Assessment: The following dyeings were compared with those performed with demineralized water at neutral pH without any impurities.

Influence of…	Addition to the dyebath	Yield	Shade change
Oxidizing agents	0.02 ml/l peroxide 35 V%	40	–
	0.05 ml/l peroxide 35 V%	25	–
Reducing agents	0.1 g/l sodium bisulfite	98	5
	0.3 g/l sodium bisulfite	90	4–5
	0.5 g/l sodium bisulfite	71	4
Water hardness	10 °dH	105	no change
	20 °dH	104	no change
Alkaline residues	pH 9	107	no change
Acid residues	pH 3	99	no change
	pH 5	105	no change
Metals	0.5 mg/l Cu	105	slightly Du
	1.0 mg/l Cu	103	slightly Du
	0.5 mg/l Fe	105	no change
	1.0 mg/l Fe	105	no change
Chlorine	5.0 mg/l Cl_2 at 25 °C	98	no change

Burnt gas fumes	Nitrogen oxides, Cycle 1	—	5
(AATCC 164)	Nitrogen oxides, Cycle 2	—	5
	Nitrogen oxides, Cycle 3	—	5

FASTNESS PROPERTIES on CO bleached mercerized Cretonne

Xenon light fastness (blue scale 1–8)		
1/25 SD	Ch	3
1/12 SD	Ch	3
1/6 SD	Ch	3–4
1/3 SD	Ch	4
1/1 SD	Ch	4
2/1 SD	Ch	5

Xenon light fastness AATCC 16E, (gray scale 1–5)		20 AFU	40 AFU	60 AFU
1/12 SD	Ch	4–5	4	3
1/1 SD	Ch	4–5	4–5	4–5

Perspiration light fastness - Xenon lamp	Ch 1/12 SD	Ch 1/1 SD
Perspiration light, acid, Nike Alpha 48 h	3–4	4–5
Perspiration light, alkaline, Nike Alpha 48 h	2–3	4

*gray scale, 1–5

Artificial light		
TL 84	Ch	G Br
A	Ch	R
CWF	Ch	G Br

Rubbing		
dry	CO	5
wet	CO	4

Water spotting		
dry	Ch	5
moist	Ch	4

WET FASTNESS PROPERTIES on CO bleached mercerized Cretonne

Wash fastness	Ch	CO	CV
49°C, AATCC 61-1996, 2A	4	5	5
60°C, C1S 1 x	4	5	5
60°C, C1S 5 x	4	5	4–5
95°C, E1S 1 x	4	5	5
Peroxide wash, 95°, E2S	3–4	5	4–5
Chlorine wash, 70°C, D3S	1	5	4–5
Chlorine wash, AATCC 61-1996, 71°C, 4A	1	–	–

	Ch	CO	WO
Water	4	5	5
Sea water	4–5	5	5
Chlorinated water, 10 mg/l	4–5		
Chlorinated water, 20 mg/l	3–4		
Perspiration, alkaline	5	5	5
Perspiration, acid	5	5	5
Perspiration, AATCC 15-1997	4–5	5	5
Chlorine Dockers Test, LS & Co, 49°C, 35-B	4	–	–

	Ch	CO	CV
Peroxide bleach, bath 1	3–4	5	5

Hot pressing	Ch	CO
Dry, immediately	3R	–
After 4h	5	–
Wet	–	4–5

FASTNESS PROPERTIES on CO bleached mercerized Cretonne

Marks & Spencer fastness properties	Staining of multifiber strip			
	Ch	**CO**	**PA 66**	**WO**
Washing 60°C, **C4A**, 1x	4	5	5	5
Washing 60°C, **C4A**, 10x	4	5	5	5
Water, **C6**	4	5	5	5
Perspiration, **C7**, alkaline	5	5	5	5
Perspiration, **C7**, acid	5	5	5	5
Perborate hydrolysis, **C11**	4	5	5	5
Chlorinated water, **C37**	2–3	–	–	–
Dry cleaning, **C5**	4	–	–	–
Rubbing, **C8**, dry	–	5	–	–
Rubbing, **C8,** wet	–	4	–	–
Steam pleating, **C14**	5	–	–	–
Hot pressing, **C13**	3R	–	–	–
Perborate, **C10**	4–5	–	–	–
Wet light with perborate, **C9A**	5	–	–	–
Oxidation bleach damage, **C10A**	4	–	–	–
Acid hydrolysis, **draft**	4	4–5	4*	5

**can be adjusted to the required standard with ALBAFIX ECO aftertreatment*

FASTNESS PROPERTIES ON CO BLEACHED KNITWEAR

Xenon light fastness (blue scale 1–8)		
1/25 SD	Ch	3–4
1/12 SD	Ch	3–4
1/6 SD	Ch	4
1/3 SD	Ch	4
1/1 SD	Ch	4
2/1 SD	Ch	4–5

Xenon light fastness AATCC 16E, (gray scale 1–5)		20 AFU	40 AFU	60 AFU
1/12 SD	Ch	4	3	2–3
1/1 SD	Ch	4–5	4–5	4

Perspiration light fastness - Xenon lamp	Ch (1/12 SD)	Ch (1/1 SD)
Perspiration light, acid, Nike Alpha 48 h	3–4	4–5
Perspiration light, alkaline, Nike Alpha 48 h	2	3

*gray scale, 1–5

Wash fastness	Ch (1/12 SD)	Ch (1/1 SD
Chlorinated water, 10 mg/l	4–5	4–5
Chlorinated water, 20 mg/l	4	3–4 R
Chlorine Dockers Test, LS & Co, 49°C, 35-B	4	4–5
Chlorine wash, AATCC 61-1996, 71°C, 4A	1–2	1–2 R
Chlorine wash, AATCC 61-1996, 49°C, 5A	1	1
Oxidation bleach damage, C10A	3–4 R	4 R

Sensitivity	Ch (1/12 SD)	Ch (1/1 SD)
Nitrogen oxides, Cycle 1	4–5	5
Nitrogen oxides, Cycle 2	4–5	5
Nitrogen oxides, Cycle 3	4–5	5

RESIN FINISHES

	CO		CV	
* Blue scale (1–8)	**Change**	**Light***	**Change**	**Light***
Methylol urea	4–5	4	4	4
Methylol melamine	4–5	4		
Dimethylol dihydroxy ethylene urea	4–5	4		
Ultra-low formaldehyde (ULF)	5	4		
Flame retardant	4–5	3–4		
Water repellent	4–5	4		
Wet cross-linking (Huntsman TE system)	5	4		
Wet cross-linking (BASF system)	5	4		
Steam cross-linking	5	4		

RECIPES

Methylol urea

90 g/l KNITTEX LPF
20 g/l TURPEX ACN NEW
14 g/l KNITTEX CATALYST MO

4 min at 150°C

Methylol melamine

120 g/l KNITTEX CHN
20 g/l TURPEX ACN NEW
18 g/l KNITTEX CATALYST MO

4 min at 150°C

Dimethylol dihydroxy ethylene urea

50 g/l KNITTEX FPC conc.
20 g/l TURPEX ACN NEW
15 g/l KNITTEX CATALYST MO

4 min at 150°C

Water repellent

5 ml/l INVADIN PBN
30 g/l KNITTEX FEL
9 g/l KNITTEX CATALYST MO
50 g/l OLEOPHOBOL CO
5 g/l PHOBOL XAN

4 min at 150°C

Ultra-low formaldehyde

50 g/l KNITTEX FEL
30 g/l ULTRATEX FMS
15 g/l KNITTEX CATALYST MO

4 min at 150°C

Flame retardant

400 g/l PYROVATEX CP new
40 g/l ULTRATEX FSA NEW
60 g/l KNITTEX CHN
20 g/l phosphoric acid

4 min at 150°C
(+ alkaline wash-off)

FINISHING RECIPES (continued)

Wet cross-linking (Ciba SC system)

220 g/l KNITTEX FA conc.
110 ml/l KNITTEX Catalyst UMP
1 ml/l hydrochloric acid conc.
50 g/l TURPEX ACN NEW

dry at 80 °C (moisture content 7–8%)
Dwell time: 24 hours at 30 °C
wash off and neutralize

Steam cross-linking

220 g/l KNITTEX FA conc.
70 ml/l KNITTEX Catalyst UMP
50 g/l TURPEX ACN NEW

Steam for 60 seconds in saturated steam
wash off and neutralize

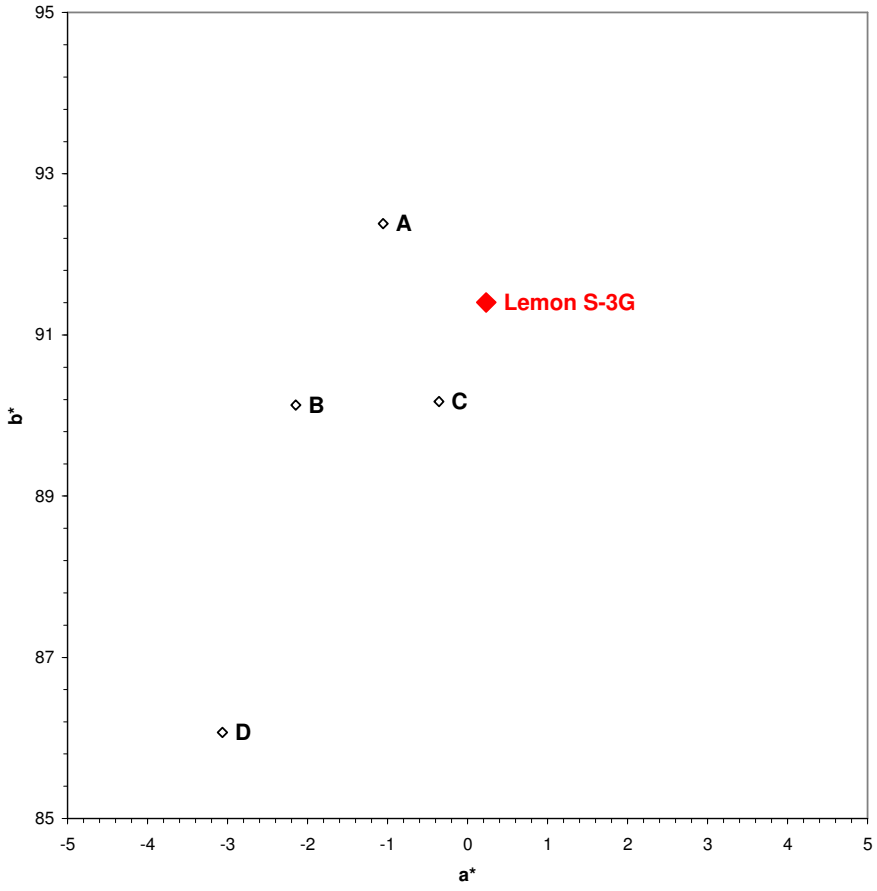
Wet cross-linking (BASF system)

catalyzed with sulfuric acid
220 g/l KNITTEX FA conc.
20 ml/l sulfuric acid 75%
50 g/l TURPEX ACN NEW

dry at 80 °C (moisture content 12–15%)
Dwell time: 24 hours at 30 °C
wash off and neutralize

POSITION OF LEMON YELLOW DYES IN COLOR SPACE

Coordinates: CIELab / Depth: 1 RD / Substrate: CO tricot, bleached, non mercerized



		1 RD
◆	***NOVACRON Lemon S-3G***	***3.07%***
A	NOVACRON Yellow F-4G (R YE 143)	2.10%
B	NOVACRON Yellow C-5G (R YE 175)	2.79%
C	Remazol Br. Yellow 3GL (R YE 186)	Not attainable
D	Remazol Br. Yellow 4GL (R YE 160)	Not attainable

COMPETITION

NOVACRON Lemon S-3G	versus	Strength in parts		
Has / is		**0.5 RD**	**1.0 RD**	**1.5 RD**
identical	NOVACRON Yellow F-4G	70	68	69
higher substantivity	NOVACRON Yellow C-5G	97	92	89
a real “warm” dye	Remazol Br. Yellow 3GL	69	–	–
a real “warm” dye, better washing-off	Remazol Br. Yellow 4GL	–	–	–

Note: Dyeing strength is highly dependent on dyeing system, method and substrate. The above figures are given as a general guide and should be checked under customer’s specific conditions.