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ABSORBENCY
Wettability, hydrophilising.

ABSORPTION
The ability of a material to take another substance into itself.

ABSORPTIVE
An absorptive substance is one which takes up liquid.
With textile fabrics
- into the fibre interior (absorption)
- on the fibre surface (adsorption, adhesion)
- between the fibres in yarn (intercapillary).

Among other things, the pre-treatment of cotton goods raises the absorptive property so that sufficient liquor is taken up in the shortest passage.

ACETIC ACID 80 %
CH_3COOH
Medium strength, volatile acid;
used to adjust the pH.

ADHERING WATER
Wetting water, surface water and all loosely adhering water, mostly present in yarn and fabric interstices, removable by pre-drying.

ADJACENT FABRIC
Undyed fabrics made of one or several fibre types, used to determine staining in fastness tests. Adjacent fabrics must be free of all finishes and residues. A differentiation is made between single-fibre and multi-fibre adjacent fabrics. Here, two types are used: Type DW consisting of CA, bleached CO, PA, PES, PAN, WO, and Type TV consisting of CTA, bleached CO, PA, PES, PAN, CV.

ADSORPTION
The depositing of mostly dissolved substances (dyes) on a fibre's surface. Adsorption has different functions in both chemical forces as well as forces occurring between solid/solid or solid/liquid phases. These forces have only the ability to retain another substance in common. The "dissolved" adsorbed material, i.e. its ions, are forced out of the solution to the boundary surfaces by water molecules and have the tendency to diffuse into them.

AFFINITY
Refers to a force with which a dye or an auxiliary binds to the substrate under the condition that no chemical reaction occurs or that no association is formed. This force results from the difference of the chemical potential between the dye in the substrate and the dyebath. The exact value of the affinity is normally unknown in practice as the required data from the dyeing process are not determined. The term affinity is thus commonly used synonymously with the term substantivity.

AFTER-SOAPING OF VAT DYEINGS
Indispensable for attaining the correct shade and optimum fastness properties. After oxidation, vat pigments are present in an extremely fine form; on after-soaping, they aggregate to form larger crystallites which are resistant to physical and chemical influences. Soaping is carried out in the slightly alkaline region at boiling temperature. With hard water, it is necessary to use water softeners.

AGGLOMERATE
Accumulation, conglomeration of molecules, ions, dyes, soil particles.

AIR-FREE STEAMER
In steaming processes with reductive chemicals, the steamer must be free from air. As a rule of thumb, a quantity of up to 0.3 % air content in the steamer does not impair the production results.

On heating the steamer, the air, which is heavier than steam by a factor of about 1.6, is forced downwards out of the steamer.
During production, there is a danger of air getting into the steamer, especially at the fabric entry point. The steam condensed on the goods produces negative pressure on the travelling fabric which must be levelled out by fresh steam. Moreover, the fabric itself brings in air with it. The volume of the air cushion depends on the production speed. For this reason, the direction of the steam flow must be aimed against the incoming fabric with at least the same speed.

The steamer's air level must be monitored in the vicinity of the fabric inlet slot. With the aid of an air checking device, this can also be quantitatively controlled. A bottle is filled with cold water, sealed shut and placed upside-down. With a very thin tube (no air bubbles may rise in the tube), water is allowed to run out of the bottle. The negative pressure which forms sucks steam from the steaming chamber into the bottle through a second tube.

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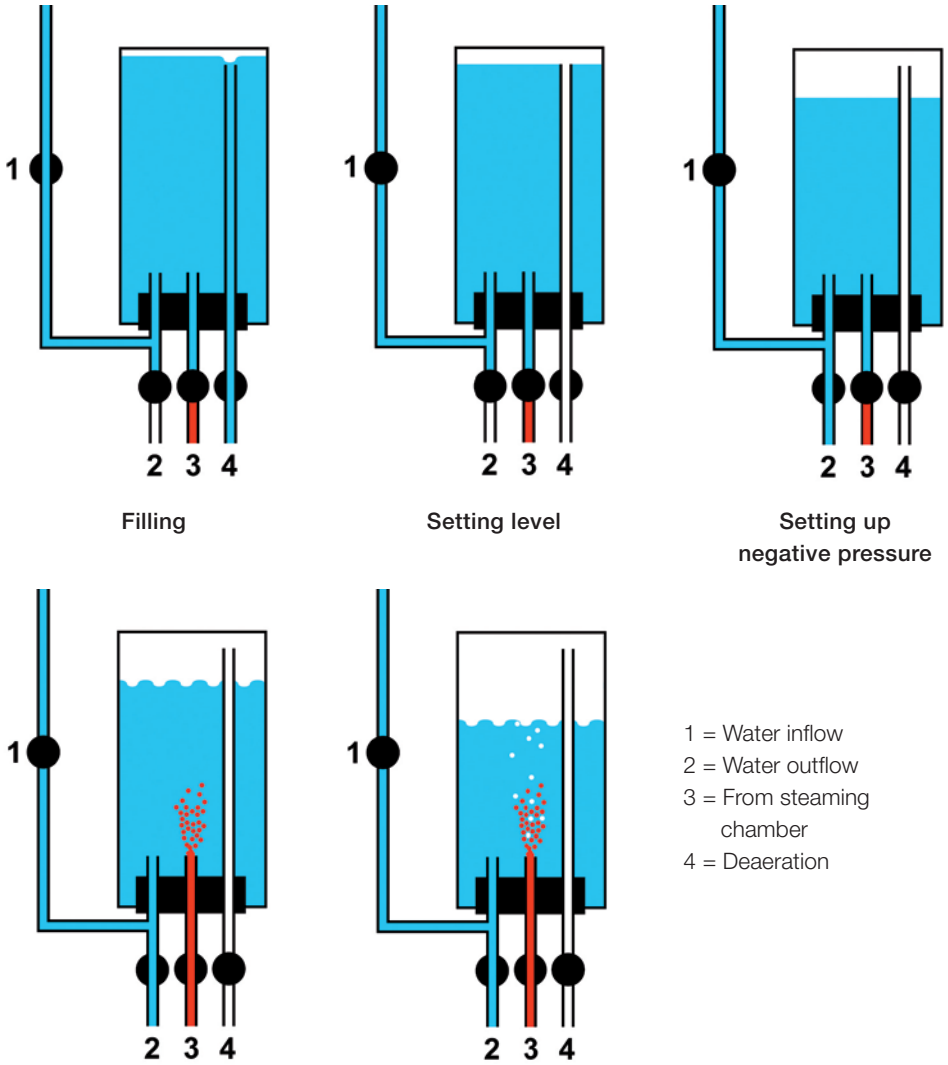
Function diagrams:



This simple method permits determination of the air content to a precision of 0.05 %.

ALKALI SPOTS

Spots which are mostly brightened in the middle becoming gradually stronger in colour toward the edges and then appear shapeless in the dyed fabric. The places on the fabric that are affected are mostly harder and are dyed a deeper shade.

ALUMINIUM SULPHATE

$Al_2(SO_4)_3 \cdot 18H_2O$

Aqueous solutions react in a strongly acidic manner to coagulating alginate thickeners.

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AMMONIA SOLUTION

NH_4OH

Weak, volatile base.

Used to adjust the pH.

Ammonia ensures optimum swelling of the synthetic thickener in pigment printing pastes. At pH values > 8 in the printing paste, ammonia prevents premature crosslinking of the binder.

AMMONIUM SULPHATE

$(NH_4)_2SO_4$

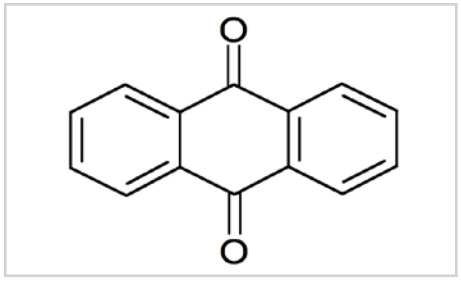
Acid donor; aqueous solutions have about pH 5. Upon boiling, ammonia escapes and sulphuric acid is released causing the pH to sink further.

ANGLE OF CREASE RECOVERY

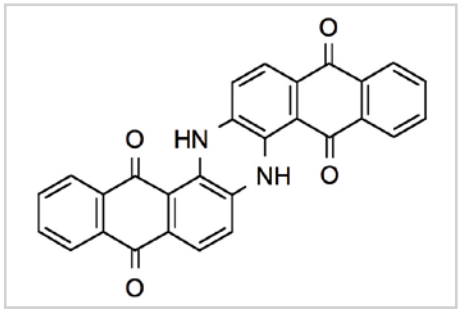
See crease recovery angle.

ANTHRAQUINONE DYE

Derived from the principal structure of anthraquinone ($C_{14}H_8O_2$, oxidation product of anthracene); it belongs to the group of quinoid dyes. Simple anthraquinone derivatives produce colour when the structural element of the anthraquinone additionally contains at least two further donor substituents (-OH, $-NH_2$).



Anthraquinone



BEZATHREN BLUE RS

ANTI-MIGRANT

Auxiliary used to influence, inhibit or block undesired dye migration, whether physically (e.g. drying) or chemically caused by the products used.

AOX

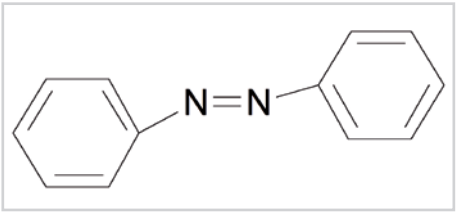
Designation for adsorbable organic halogens. The AOX content in waste water is one of the essential evaluation criteria for the quality of industrial water. Sources of AOX are, for example, laundry impurities (used oil, etc.) disinfectants, washing auxiliaries, secondary reactions when using active chlorine, or the consumption of industrial water, auxiliaries with organically bound chlorine (carriers based on chlorobenzene), using chlorinated or chlorine-eliminating products, preservation agents with chlorine basis (e.g. in natural thickeners), or dyes (vat, disperse, reactive dyes).

ATMOSPHERIC HUMIDITY

A differentiation is made between absolute atmospheric humidity (water vapor content in g/m^3 air), relative atmospheric humidity (the relation, given in percent, between the momentary water vapour content of the air and the maximally possible water vapour content at the given temperature), specific humidity (expressed as the water vapour content in g/kg), normal humidity (corresponding to a Central European climate in the middle of the year with the daily average of about 65 % relative atmospheric humidity) and the standard climate (in DIN 53 802 the standard climate for textile tests has been defined at 65 % ± 2 % rel. humidity and 20 °C ± 2 °C room temperature).

AZO DYE

These dyes have the characteristic azo group -N=N-, which is represented to a greater or lesser extent in nearly all dye groups. Depending on the number of azo groups in the molecule, a differentiation is made between monoazo and disazo dyes (2 groups in the molecule) and polyazo dyes with 3 azo groups or more. As a rule, azo dyes are destroyed by a reduction clearing treatment and are not suitable for vat or sulphur dyes, except in discharge printing.



Azo group

B

BARRINESS

Also called barré, barriness or horizontal stripes in knitwear/woven fabrics of viscose, polyamide or polyester.
Causes:

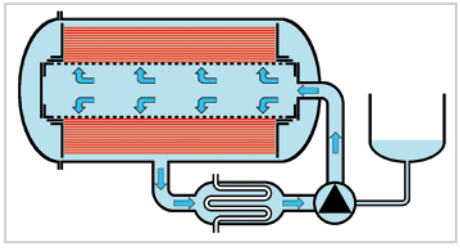
- Processing defects such as yarn mix-up
- Tension and density differences in wovens/ knitwear
- Yarn defects such as titre-, yarn twist-, lustre- and deformation differences
- Drawing-, crystallline structure-, orientation differences
- Chemical differences with polyamide and viscose
- Alteration of the fibres due to light- or chemical effects

BATH EXHAUSTION

Concentration difference in the dyebath before and after dyeing as determined by colorimetric measurement, given in % of the original liquor concentration. The bath exhaustion is dependent on the dye build-up in each case.

BEAM DYEING MACHINE

HT beam dyeing machine for piece dyeing or beam autoclave for yarn package dyeing. Piece dyeing machines have tank diameters of 1000, 1200 and 1500 mm and working widths of up to 4000 mm with a max. operating pressure of 5 bar and a maximum dyeing temperature of about 135 °C. Dye beam diameters vary from 500, 600, 700 to 800 mm, depending on the fabric thickness. Cloth beams have covering rings which permit dyeing narrower fabric widths. Woven and knitwear fabrics are dyed in the open width. There are no running creases, felting or loss of fibres with sensitive-surface goods. Mechanical damage to knitwear (loop distortion, snagging) is ruled out. Inserting dividers in the fabric beam can lower the liquor ratio. In beam dyeing, the direction of the liquor flow is inside-to-outside (centrifugal pump), but this can be easily reversed by changing the direction of rotation with axial pumps. Controlling the differential pressure is important.



Beam dyeing machine

BERLIN BLUE

Ferric cyanoferrate (II), also called Paris blue or Prussian blue; dark blue pieces soluble in oxalic acid, used to prove the presence of iron on the goods.

BERLIN BLUE REACTION

Coloristic proof of hydrated cellulose and oxidised cellulose.

BLANK DYEING

Treatment of textile goods according to a normal dyeing recipe but without dye. Used to test the influence of the dyeing conditions on the material in the absence of dyes.

BLANK VALUE

In the examination of textiles, the comparative value of an untreated starting material.

BLANK VAT

Alkaline sodium dithionite solution used in vat dyeing but without dyes. Applied to brighten and level vat dyeings and in the pigment padding process for development.

BLEACHING

Chemical treatment of textiles with appropriate bleaching agents to brighten or remove colour tones of natural fibres due to growth or of man-made fibres due to how they were manufactured. The destruction of natural or manufactured colouration can be carried out oxidatively as well as reductively, or by a combination of both processes, where in every case the greatest possible protection of the fibre is a requirement. The bleaching chemicals used are chlorine-based, oxygen products, or reduction bleaching products.

BLUE DEGRADATION

Caused by yellow vat dyes which accelerate the photodegradation of blue vat dyes and therefore can only be applied together with blue dyes for green shades up to a defined maximum concentration (see Catalytic fading).

BLUE SCALE

Comparative scale consisting of eight levels for evaluating light fastness (Level 1 = poor; Level 8 = very good). It consists of standard dyeings on smooth wool fabric with graduated sensitivity to the influence of light.

BOOSTER

Device to apply a blank vat for the continuous method. The booster is located in the steamer.

B

BORAX
See sodium tetraborate.

BREAKING STRENGTH
See tensile strength.

BRONZING
A defect which shows up as a metallic-glittering appearance and is associated with poor rubbing fastness properties. Causes: inadequate pre-treatment (oil residues, etc.), dye precipitations, dye oversaturation on the fibre, and premature oxidation in sulphur and vat dyeings.

BUILD-UP
Colour yield of an individual dye in the fibre, related to the amount of dyes applied.

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C. I.
Colour Index, reference work for dyes (trade names, constitution), optical brightening agents, reduction agents, developers. Published by: The Society of Dyers and Colourists.

CAMOUFLAGE DYEING/PRINTING
Formerly, armies practically only used dyed fabrics for camouflage articles; today, most textile substrates used for this purpose are printed. Experience has shown that patterned camouflage articles, based on the blending of sharp contours, are much better adapted to the surroundings and thus more difficult to recognise. The design and colouration of the patterns are adapted individually to the local surroundings in each case. Here, however, it is not enough that the hues or shades of the pattern fit the colours of the surroundings. With the present state-of-the-art, military personnel have the latest night vision equipment at their disposal which enable visualisation of recordings in the non-visible infrared range (700 - 2500 nm). For this reason, it is absolutely necessary that the reflectance values (curves) of the dyes used correspond to those of the surrounding colours (e.g. Leafgreen) both in the visible region (400 - 700 nm) as well as in the IR region. In order to achieve this, specially selected dyes must be used. Moreover, most purchasers of printed camouflage articles specify special requirements in addition to defined requirements such as reflectance values. The IR reflectance of textiles also depends heavily on the bleaching (IR reflectance of bleached goods 70 – 90 %, of unbleached goods only 50 – 30 %). With titanium white, the IR reflectance values are increased and with carbon black, they are lowered.

CARCINOGENIC
Cancer-producing.

CATALYTIC FADING
Mutual negative influence on the light fastness of dye combinations. The light fastness of the combination is lower than that of the individual components. Encountered especially with certain vat dyes but also with substantive and disperse dyes (see Blue degradation). Occurs especially with azo blue dyes, less strongly with anthraquinone blue, in combination with azo yellow, azo orange and azo red dyes.

CAUSTIC SODA (LYE)
Sodium hydroxide (NaOH).

CAUSTIC SODA SOLUTION
See sodium hydroxide.

CAVITATION
Cavitation is the formation and dissolution of cavities in liquids due to changes of pressure. Cavitation may either be gas- or vapour-cavitation. In the case of a “soft” gas-cavitation, the hollow space is filled with gas which is dissolved in the liquid. Those gases redissolve in the liquid. In the case of vapour-cavitation, also called “hard”-cavitation, the hollow spaces contain the vapour of the surrounding liquid. If the static pressure drops below the vapour pressure of this liquid, vapour bubbles are formed. Increasing the static pressure leads to instantaneous condensation of the vapour in the bubbles, which may result in extreme values for the pressure and temperature. Cavitation is the result of a local lowering of pressure. Increasing the temperature of the carrier liquid minimises the need to lower the pressure. Cavitation mostly occurs in centrifugal pumps in the edges of the idler wheel. The flow of the liquid may then be reduced or even stopped. In extreme cases, this can damage the pumps.

CENTRIFUGE
(Extractor, hydroextractor, whizzer); used to remove water (pre-drying) from textile materials. Depending on the type of fibre, residual moisture levels of 15 % are attainable. Perforated drums (of up to 2000 mm in diameter) either swinging vertically in ball joints, hung at 3 points as pendulum-type, suspension, cage or verticle centrifuges, also with so-called slide-swinging bearing or in horizontal or vertical positioning as horizontal, open-width or beam hydroextractors. Most centrifuges are driven by electric motors at about 750 – 1200 rpm.

CHANGE OF SHADE
Colour change of a dyed textile according to fastness tests as determined by > Grey Scale for colour fastness.

CHANGE OF SHADE FROM SELVEDGE TO CENTRE
In textile printing and dyeing, change of matching shade from dark to pale from either centre-to-selvedge, on one or both sides (listing), or the end of a batch shows a paler or deeper dyeing compared with the middle or the rest of the fabric.

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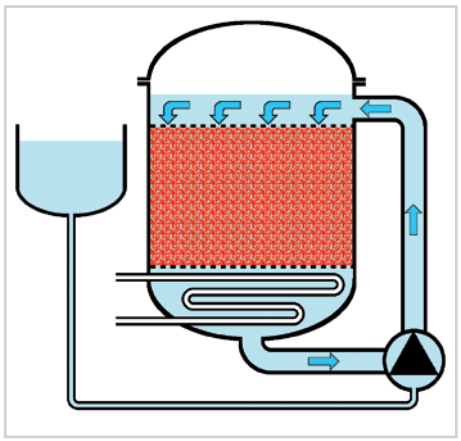
CHROMOPHORE

The name is of Greek origin and means carrier of colour. The chromophore is the part of the dye in which excitable electrons are available. In the case of inorganic dyes, these are partially filled inner electron shells of the transition metals. In organic dyes, the chromophore is often a system of conjugated double bonds.
The π-electrons of the double bonds can be elevated by small amounts of energy to higher energy levels. Absorption of electromagnetic radiation, like light, can provide the necessary energy. The π-electrons of a system with only one double bond cannot easily be excited, they only show absorption in the short-wave ultraviolet range. By adding more double bonds as conjugated systems, the π-electrons become more easily excitable in the higher wave-length range. Thus, the absorption band is shifted into the visible range of the spectrum.
Parts of the spectrum in the visible range are then absorbed. The complementary colour of the absorbed wavelength becomes visible to the human eye.

CIRCULATING-LIQUOR MACHINE

Differs from a dyeing machine in how the material remains immobile while the liquor is circulated through it.



Circulating-liquor machine

CITRIC ACID

$C_6H_8O_7 \cdot H_2O$
Strong non-volatile acid;
used to adjust the pH.

COAGULATION

Also flocculation of colloidally loose particles by agglomeration, flocking, lumping and sinking to the bottom as an insoluble gel. Occurs by heating or by adding electrolytes or opposite-charged colloids.

CO-CURRENT FLOW

In drying, the hot air can be directed in or against the direction of the moving fabric. Co-current flow is used with:

a) Front zones having a higher circulating air temperature; here co-current flow increases the evaporation effect.
b) Last zones having a lower circulating air temperature; here co-current flow reduces among other things the loss of heat with the exhaust air which is suctioned off only here.

COLLOID

Unlike a crystalloid/crystal, a colloid is a non-crystallising substance, e.g. protein, gelatine, starch, cellulose; colloids are not a family of substances but a term of the degree of dispersion of the material. All colloids occur in different states, a sol (= solution) or gel (= flocculation, coagulation).

COLORIMETRY

The science of determining and specifying colours among one another. For this, it is necessary to describe and measure colours by a measured value. Colour, however, is not a physical property of bodies but a sensory impression conveyed by the eye. Colour perception cannot be directly measured. All that is measurable is the radiation which, proceeding from the light source, is reflected by a body and strikes the human eye. This radiation is called the colour stimulus. The only aspect of interest to colour measurement is the relative radiation distribution, i.e. the relation of radiations over the entire visible spectrum among one another. Some illuminants with their relative radiation distribution have been standardised. An example of this is D65 with a radiant energy distribution corresponding to average daylight. The magnitudes X, Y and Z (tristimulus values) depend not only on the illuminant and the reflectance but also on the visual field of the observer. The visual field has an influence on the spectral distribution curves $\bar{x}$ (especially sensitive to red), $\bar{y}$ (sensitive to green) and $\bar{z}$ (sensitive to blue). The tristimulus values X, Y and Z are not very descriptive. For an understandable representation of colour, the chromaticity coordinates x, y and z are calculated. These give the magnitude of the portion of each colour value in the entirety of all 3 values. Here, x and y permit recognition of the hue and saturation which are summarised in the term chromaticity (z is not required for the characterisation but can be calculated). As the third magnitude in the representation of colour stimulus specification,

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or colour valence, the luminosity is expressed by the tristimulus value Y. The luminosity is plotted vertically to the colour level (x, y). The diagram is described by x on the abscissa and y on the ordinate. This produces a constantly curving, unclosed spectral colour pattern. The straight link between the two end-points forms the purple line with the mixed secondary colours of the spectrum ends. The achromatic point, which gives the chromaticity of white, grey and black colours lies in the approximate middle. Lying on the straight lines between the achromatic point and the spectral colour pattern are colours of the same hue but of different saturation, which increase with their distance from the achromatic point. This colour diagram has been standardised by the CIE. In order to characterise colour differences, numerous colour gradation formulas have been developed which give the colour difference DE*.

COLOUR DIFFERENCE

In the case of the same two dyeings having the same CIE tristimulus values X, Y and Z. the tristimulus values can be converted with the aid of a colour difference formula to a number which is a measure of the visual difference. This figure is also called colour difference DE*.

COLOUR MEASUREMENT

Since the human eye's perception of colour depends on many factors such as age or the observer's momentary condition, a method was developed which excludes these factors. Colour measurement is an instrumental technique for measuring colours. It serves the objective evaluation of a defined object. The scientific basis for colour measurement is based on the existence of three different groups of signals that are transmitted by the eye of the observer:

1. Blue cones (sensitivity to short waves);
2. Green cones (middle waves);
3. Red cones (long waves).

In order to be able to determine the colour stimulus specification sensitivity in numerical values, the values of the spectral value functions of the eye were standardised and summarised under the definition of the "CIE Standard Observer". In reality, this standard observer is a table of numerical values which represent an average normal human observer. The advantage of this is that the values obtained are internationally recognised and comparable.

COLOUR MEASURING DEVICE

Spectrophotometer consisting of 4 basic elements: a light source, a prepared sample, a monochromatic filter (filter, prism or optical grating) and a photoelectric receiver. These devices are divided into: a) tristimulus filter photometers for colour measurement by the luminosity process and b) spectrophotometers according to the spectral process (most exact method).

COLOUR OF LIGHT ABSORPTION

See complementary colour.

COLOUR VALENCE

Also termed colour stimulus specification. With the comparative consideration of two colour stimuli, it causes the impression of sameness/difference as a result of the colour stimulus function. The colour valence is especially decisive in additive colour mixing.

COLOUR YIELD

Amount of dyes fixed on the textile substrate, in % by weight of the amount applied.

COMMON SALT

Sodium chloride (NaCl).

COMPLEMENTARY COLOUR

Colour of light absorption.

Wavelength [nm]	Complementary colour	Reflected complementary colour
400 – 435	Violet	Yellow-Green
435 – 480	Blue	Yellow
480 – 490	Green-Blue	Orange
490 – 500	Blue-Green	Red
500 – 560	Green	Purple
560 – 580	Yellow-Green	Violet
580 – 595	Yellow	Blue
595 – 605	Orange	Green-Blue
605 – 750	Red	Blue-Green
750 – 800	Purple	Green

COMPLEX FORMER

(Also called chelating or complexing agents). Products which through functional groups are capable of complexing metal ions and thus improving their solubility in a certain milieu. This takes place through the coordinative binding of undesired metal ions in a soluble complex so that metal precipitations in the bath and on the textile are prevented and so that metal compounds already on the textiles are dissolved. Sequestering agents are

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classified in two groups: inorganic (group of complex phosphates > Ion exchange principle) and organic sequestering agents (oxalic, tartaric and citric acid and their sodium salts). Both are apparently very similar in respect to their binding of earth alkali and heavy metal ions but can be clearly differentiated under defined conditions (pH, time, temperature). When dyeing with metal-containing dyes, demetallisation can occur when organic sequesting agents are used.
Inorganic polyphosphates, on the other hand, can be applied in all dye-baths with metallised dyes with the exception of 1:1 metal complex dyes. Sequestering agents have an oxygen-stabilising effect on peroxide combinations and a fibre-protective effect on cellulose. Polyphosphates increase the washing power and are very important in detergents.

CONDENSATE

Condensation of evaporated water from steam pipes and tanks, to be regarded as soft water and is usually conveyed back to the steam boiler in the production plant.

CONDITIONING

I. Adaptation to defined conditions, such as a standard climate of 20 °C ± 2 °C and 65 % ± 2 % relative humidity.
II. Term used for determining the moisture content of textile grey goods in conditioning machines. As textile fibres absorb more or less moisture depending on their hygroscopic properties, a defined water content (standard moisture regain) is conventionally accepted in commercial practice. By adding the standard moisture regain to the absolute dry weight (dried at 105 – 110 °C), the legal commercial weight is obtained.

CONTACT DRYING

Here drying is carried out through contact with heated cylinders or plates.

CONTINUOUS DYEING

Dyeing process where the dye liquor is applied to a moving fabric.

CONTINUOUS DYEING RANGES

Depending on the class of dyes used, these may consist of a pad dyer, drier (IR, hot flue, cylinder drier), steamer and open-width washer.

COUNTER-FLOW

Washing liquors or drying air flow against the direction of the moving fabric.

CREASE PREVENTING/INHIBITING AGENT

Auxiliary for preventing running creases, especially when fabric is treated in rope form.

CREASE RECOVERY ANGLE

Serves as magnitude for measuring the effect of crease resistant finishes. As a measure of the recovery capacity of a textile, it is the angle which is formed after a defined elapse of time when a straight thread bent 180° is relieved after the previous stress. A differentiation is made between the crease recovery angle in the dry and the wet state.

CREASE RESISTANCE

Measure of the resistance of textiles to creasing.

CREASE-RESISTANT FINISH

Resin finishing of cellulose to reduce creasing to a minimum.

CREASING

The sensitivity of fabrics to constant bending, deflection, flexing, pressing or crushing in a crosswise direction to the warp and weft threads. The evaluation is made based on the crease recovery angle. It depends on the fibre structure, mechanical fibre properties, the state of swelling, the water and air content of the fibres, the yarn and fabric structure and the finishing.

CROCKMETER

American standard device for testing the rubbing fastness of dyed textiles.

CROSS-WOUND PACKAGES

Yarn cross-wound on cylindrical or conical bobbins (also called cheeses) in such a way that each layer crosses over the previous one. As carrier or supporting elements, tubes or holders made of paper prepared coated paper are used, and for dye packages, perforated bobbins made of stainless steel or plastic are used. Depending on the cross-wound form, a differentiation is made between cylindrical and conical bobbins (cones) with straight and cone-formed faces. For man-made fibre filaments, cone-shaped bobbins with conical faces are most commonly used as double-cone packages.

CROSS-WOUND PACKAGES IN DYEING

In dyeing cross-wound packages, the type and quality of the winding as well as the bobbin and

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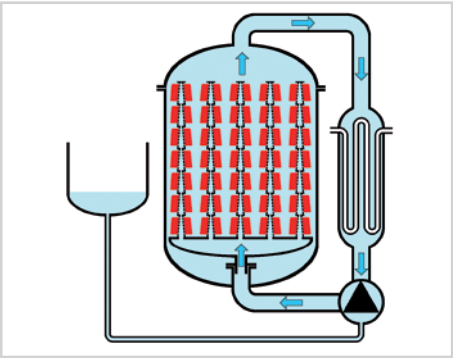
holder system have a particular influence on the quality of the dyeing. Cone-shaped bobbins are widely used but exhibit the following disadvantages compared with cylindrical ones: uneven liquor through-flow, leakage losses in the bobbin and the dividing plates, low batch weight and unfavourable liquor distribution. As a result, the dye and chemical supply for the fibres is not uniform, which leads to levelness problems, especially in the edge areas. Moreover, liquor losses with conical bobbins are problematic and can be as high as 50 %. Further disadvantages with cone-shaped bobbins are the handling and the capacity utilisation of the equipment. All bobbins must be rounded off so as to reduce the danger of liquor depletion in the edge areas. When loading and unloading the dyeing machine, every dyeing column must be stacked and unstacked with bobbins and dividing plates. Conical bobbins cannot be pressed, which leads to lower operating economy. They also exhibit so-called dead zones, where liquor depletion can occur. To achieve a more uniform liquor supply in the edge areas of the bobbins, they must be broken at the edges.



Package dyeing apparatus

CROWSFEET

Dyeing trade term for creases and wrinkles in the rope of treated, densely woven piece goods (poplin, gabardine).

CYLINDER DRIER

Drying tapes and fabrics in open width by passing them over heated stainless steel drums. For increased efficiency and better utilisation of heat, cylinder driers are constructed in enclosures with added ventilation. Any steam formed during drying on vertical or horizontal cylinder driers is drawn off via steam exhaust hoods. Contact drying becomes possible through contact of the goods to be treated with surfaces warmed by heat conduits. Both one-sided or two-sided contact drying is possible. Unlike conventional, contact-free drying, with cylinder drying there is a danger of dye migration.

D

DEAD COTTON
Cotton fibres which die before ripening and which, unlike immature cotton, contain no protoplasm. The fibres have thin and transparent cell walls, tender ends, and are squashed flat. Their dye affinity and stretch is less than mature CO (pale places occur on dyeing) and can only be levelled out by a strong NaOH treatment (mercerisation).

DEGREE OF HARDNESS
See water hardness.

DIAMMONIUM PHOSPHATE
$(NH_4)_2HPO_4$
Aqueous solutions are slightly alkaline. Upon heating, ammonia escapes and the pH value sinks. Acid donor (catalyst) for crosslinking pigment binders/fixatives. Ensures optimum fastness properties.
Application amounts: 2 – 3 g/l in form of a 1:2 solution.

DICHROMATIC
Two-coloured.

DIFFERENTIAL PRESSURE
Pressure difference between the inside and outside of bobbins or HT beams. Normal values range from 0.3 – 0.8 bar. With tightly-wound packages, higher values are possible.

DIFFUSION
Progressive movement of molecules of a substance by natural self-motion. A dissolved substance migrates from places with higher concentration to places with lower concentration until a concentration equilibrium has occurred within the system. This process is accelerated by raising the temperature.

DIN
Deutsche Industrie Norm (German Industrial Standard).

DIOXIN
Collective term for 75 chemically related substances which differ widely in their toxicity. Close chemical relationship with dibenzofurans (group of 135 substances). Both have a skeletal structure of carbon, hydrogen, oxygen and chlorine atoms. Dioxins have a carcinogenic effect.

DISCHARGEABILITY
The capacity of a dye to be discharged depends on its constitution. It is important to consider the available azo groups, where the azo bridges split upon being discharged. Many azo types are not perfectly dischargeable owing to their fibre-substantive decomposition products. A differentiation is made between white and coloured discharges.

DISPERSING AGENT
Dispersing agents act as distributing agents in aqueous treatment baths. They counteract the separation of poorly soluble substances and are mostly surface-active compounds.

DYEING PARAMETERS
All factors which influence the dyeing process.

DYEING TENDERERS
Certain vat dyes under defined conditions in oxidation processes tend to act as catalysts in the partial degradation of cellulose. A differentiation is made between bleaching, dyeing and light tenderers. The same dye does not act the same in all three categories. Dyeing tenderers only act when the goods to be dyed are exposed to sunlight in open circulating liquor machines and the dyeing is oxidised by repeated lack of sodium dithionite and must therefore be reduced again.

E

ELECTROLYTE
Substances that break down into ions upon dissolving in water. This makes the solvent conductive for an electrical current. The most important electrolyte groups are acids, bases and salts. Electrolytes are often used to reduce (cut) dyes and textile auxiliaries. Electrolytes increase the substantivity of the dye to the fibre.

ENDOTHERMIC
Heat-absorbing, opposite of Exothermic.

ENGLISH BLUE
In the 18th century, the collective term for the processes of applying indigo as vat directly on a specific place on the goods (Orpiment).

ENOLE
Organic compounds characterised by a double bond and an adjacent hydroxyl group (OH). Name results from: "en" as the name of numerous compounds with double bonds and "ol" from alcohol.

EXHAUST DYEING PROCESS
The exhaustion of the dye out of the dye-bath based on the substantivity of the dyes to the fibre is characteristic. In contrast to the continuous dyeing process, the liquor ratio is higher and the concentration in the dye-bath is lower in the exhaust process. Strand or rope forms are dyed on dyeing machines and open width forms or as yarn in circulating-liquor machines.

EXHAUSTION TENDENCY
See substantivity.

EXTENDER
Products which strengthen the finishing effect of another textile auxiliary so that the application concentration of the latter can be reduced.

F

FASTNESS TEST
Test of the resistance of dyeings and prints to influences during textile manufacture (Processing fastness) and in normal use (General use fastness). For evaluation purposes, the tests can be carried out with > Adjacent fabrics. Subsequently both the change of shade during treatment and possible staining of adjacent fabrics are evaluated. Evaluation is made with the > Blue scale for the > Light fastness properties and the > Grey scale for all other fastness tests.

FASTNESS TO WATER DROPS
Resistance of dyeings/prints to drops of distilled, condensed or rainwater. The guideline applies to all types of fibres. A few drops of distilled water are worked into the test specimen with a glass rod. Evaluation is made after 2 min (moist) and after completion of airdrying. Evaluated using the Grey Scale.

FEED LIQUOR
Technical dyeing term for any corrective dye feed liquor necessary to attain pattern conformity when dyeing. Padding liquor feed: with continuous dyeing and finishing processes, exhausted liquor is constantly replaced.

FIBRE MOISTURE
Moisture absorption of fibres, moisture surcharge.

FIXOTEST DEVICE
For determining the contact heat stability of dyeings and prints (Dry Heat Fixation Fastness ISO 105-P01, Fastness to Ironing ISO 105-X11). Test performed on three pairs of plates, each time in a working procedure at 150, 180 and 210 °C.

FLASH AGER
Energy and space-saving rapid steamer consisting of a liquor application device, an IR zone for precipitate-free heating of the goods, a steamer and a steam superheater with the steam directed on the counterflow principle, a water lock to prevent air from entering, and a ceiling heater against the formation of droplets. Steaming times are 5 – 30 s, fabric drawing-in length 4 – 10 m, steam consumption 100 – 200 kg/h. Especially recommended for reactive and vat dyes, causticizing of regenerated cellulose fibres and the continuous alkalisation of PES.

FORMALDEHYDE 20 %
CH_2O
Slightly water-soluble, pungent-smelling gas. Has a reductive and strongly antiseptic effect. Preserving agent.

FORMIC ACID
HCOOH
Strong, volatile acid.
Used to adjust the pH.

G

GLAUBER SALT
Sodium sulphate (Na_2SO_4); electrolyte.

GLUCOSE
In the form of a fine white powder, crystals, or a thick colourless syrup, with the formula $C_6H_{12}O_6$; strongly hygroscopic; readily soluble in water; exhibits a neutral reaction. A differentiation is made between α and β; β-glucose molecules are the basis for cellulose. Glucose is used in vat dyeing to protect against the over-reduction of blue dyes (of the RS; BNsp. type) above 80 °C.

GLYCERIN
$C_3H_5(OH)_3$
Solvent for dyes, hygroscopics.

GOLDTHWAIT TEST
Used to differentiate mature/immature cotton via test dyeing with a mixture of C. I. Direct Green 26 and C. I. Direct Red 81: immature CO dyes green, mature CO red (> red-green test).

GREEN DEGRADATION
Combination dyeings with yellow, green and blue dyes when exposed to light and weathering, can behave more unfavourably than expected based on the light fastness of the individual dyes of the combination. The dyeings don't turn greener but rather yellower, even when the green combination element in its standard shade has very high light or weathering fastness. This behaviour depends on the combination of the dyes and their mixture ratio, the shade depth, the substrate (mercerised or non-mercerised CO) and its moisture content, the intensity of the ultraviolet light radiance and the atmospheric humidity. In order to minimise this effect, it is advisable to carry out preliminary tests with all yellow-green and yellow-blue combinations.

GREY SCALE
I. Grey scale for evaluating staining: consists of five pairs of grey and white colour platelets, each pair shows a difference in shade and contrast. The visual difference between the undyed adjacent fabric and the stained test specimen is compared with the contrasts of the grey scale:
Rating 1 = heavy staining
Rating 2 = moderate staining
Rating 3 = staining
Rating 4 = slight staining
Rating 5 = no staining

II. Grey scale for assessing colour changes (similar to I.), only in this case the visual difference between the scale and the test specimen is compared:
Rating 1 = poor
Rating 2 = moderate
Rating 3 = rather good
Rating 5 = good
Rating 5 = very good

H

HANK, ROPE
a) Hank = yarn form
b) Rope = piece goods form (fabric gathered in the warp or stitch wale direction, in the form of free fabric transport in pre-treatment and dyeing processes).

HORIZONTAL PAD DYER
Pad dyer in which the goods are padded in the nip between the rollers without a trough.

HOT FLUE
Hot air drying machine for fabric or for intermediate drying. The passage of the goods is mostly either vertically up and down in the hot air chamber or slanted back and forth with double-sided ventilation nozzles from the top and the bottom.

HT DYEING
Dyeing textiles at temperatures > 100 °C in high-temperature dyeing machines. Advantages: prevents pump cavitation and thus ensures dyebath circulation. Specific advantages for different fibres: cellulosic fibres have lower swelling behaviour, better dyeing-through properties, more rapid levelling and thus the possibility of reducing the dyeing time. When dyeing under HT conditions, hydrosulphite is not an adequate reduction agent; a temperature-stable agent must be used.

HT DYEING MACHINES
High-temperature dyeing machines offer the possibility to pressurise the dyeing system in order to raise the boiling temperature of the dye-bath and to rule out pump cavitation. The upper limit is not set from the dyeing standpoint, but it is a regulation of the German Technical Testing (TÜV) authority as the material-specific upper limit for the steel walls of pressurised vessels of normal thickness.

HYDROCELLULOSE
Water absorption or the rupture of the oxygen bridge between the glucose structural elements causes mineral acid-damaged cellulose. Properties: weakened strength, strong reduction power, changed colour affinity. Proof: hydrocellulose alone with ammonium-alkaline silver nitrate solution, or with Berlin blue reaction, Fehling's solution. No dyeing effect by Diamine Blue 2B, Congo Red or benzopurpurine.

HYDROGEN PEROXIDE
See peroxide.

HYDROSULPHITE
Sodium dithionite ($Na_2S_2O_4$).

HYDROSULPHITE MEASUREMENT
See sodium dithionite measurement.

HYGROSCOPICS
Water-attracting products added to finishes, printing pastes, and sizes to level out air humidity and fibre moisture as well as influence the weight and handle of the goods.

ILLUMINANT

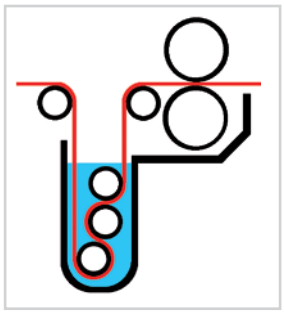
The illumination of an object can proceed from various light sources and one or several light emissions. Based on the fact that the perceived colour depends on precise and reproducible conditions, it was necessary for instrumental colour measurement to define standardised conditions for the emission of light radiation with respect to the wavelength, the illuminants. Their specification was made based on the characteristic features of the spectral distribution curve which resemble natural light sources. The most important illuminants defined by the CIE are A (imitates incandescent lamp light) and D65 (corresponds to average daylight with UV component). A further illuminant sometimes used in the textile industry is TL84 (3-band light). This illuminant was developed by Marks & Spencer and corresponds to the light used by Marks & Spencer in its department stores.

IMMERSION LENGTH

Impregnation time for uniform wetting of the goods between dipping and squeezing off.

IMMERSION SQUEEZING

In order to intensify the liquor exchange in wet-on-wet processes or the wetting in dry-on-wet processing at high production speeds, additional immersion squeezers are used.



Horizontal pad dyer with immersion squeezing unit

IMPREGNATION

Lat.: Drenching, soaking; the treatment of textiles with solutions, dispersions, emulsions. For all continuous and semi-continuous processes. Impregnation is understood as the passage of a fabric through an impregnation solution, followed by uniform squeezing over the entire length and width of the goods.

INDICATOR

A reaction-sensitive substance which indicates defined reactions by a typical change of colour.

INDIGO

Originally a natural blue dye from indicane-containing plants (indigofera types) in East India and China, known as the oldest blue vat dye. The active ingredient, indigo, is obtained by fermentation, oxidation and boiling of the dried plants, whereby 100 kg dried plants produce 1.5 – 2 kg of indigo dye. The colourless compound is converted into yellow vats by fermentation and alkali. The blue shade develops only in the air, through oxidating oxygen. Indigo first came to Europe in the 16th century when, thanks to its high yield, it displaced the woad root which had been used before. The importance of natural indigo declined rapidly after the development of synthetic indigo in 1880.

INDIGO TEST

The most commonly used process to prove indigo dyeings. After dabbing with concentrated nitric acid, a yellow-green-bordered spot appears (= oxidation of the indigo to yellow isatin).

INFRARED (IR)

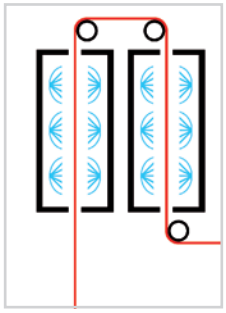
IR radiation which is not observed by the human eye in the longwave region. The wavelengths lie between 780 – 1,000,000 nm. Only a small portion of the 780 – 3000 nm of the vibration spectrum is of practical interest. The transition range is between 700 – 860 nm. All bodies give off IR radiations, and the warmer the body, the more intense the radiation and the shorter the wavelength will be. IR radiation is also termed thermal radiation.

INFRARED REFLECTANCE

The diffuse reflection of IR waves. In the textile sector, wavelengths between 700 – 2500 nm play an important role in camouflage prints and dyeings.

IR DRYING

Drying technology preferentially uses the invisible IR radiation of the electromagnetic wave radiation spectrum. The wave range which is most important from the technical drying standpoint lies between 700 – 3000 nm, where particles are set in more rapid vibrations which warms the goods. Radiation dryers are used only in the first drying zone. As they have a high power density and, with a good harmonization of the emission and absorption conditions, a high specific evaporation effect, there is a danger of surface damage to the goods if the wet-bulb temperature is exceeded. Therefore, in order to achieve high economy in heating the material, an IR radiator must be used whose emissions basically lie within the region around 3000 nm. Radiation temperatures between 500 – 800 °C are preferred, where the absorption conditions of textiles and water are very favourable.



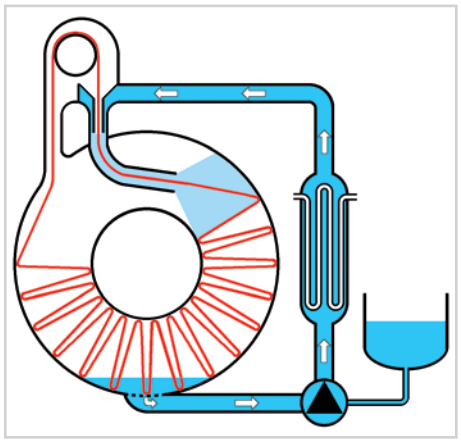
IR-dryer

ISOTHERMAL DYEING

Rapid dyeing process at a constant temperature.

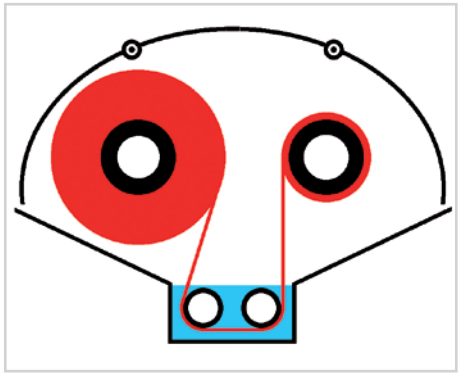
J

JET
(Water jet, tube, nozzle), commercial name for nozzle dyeing machines of various types and models. Here, the fabric rope in combination with guide rollers is transported by the nozzle principle or simply with nozzles through a tube through the dyebath. The high fabric speed of 100 – 250 m/min and the turbulence surrounding the fabric rope, depending on the machine type, ensures good laying and opening action. The fabric and longitudinal stretch can be adjusted as required by regulating the liquor flow. In case of foaming, which can occur with a low liquor content, uniform fabric transport is no longer ensured and can lead to machine stoppage. Adding defoamers is helpful, but ecology/wastewater considerations must be taken into account.



Jet

JIGGER
Short-liquor dyeing machine where the fabric, wound around a lap roller, is rewound on a rewinding roller and, during the rewinding process, is led through a treatment bath.



Jigger

K

KUBELKA-MUNK VALUE (K/S)
Characterises the optical properties of a coloured test specimen as a double constant consisting of K = light absorption (absorption constant of dyes) and S = light scattering (caused by the textile).

L

LEUCO
From Greek: white, colourless.

LEUCO COMPOUNDS
Water-soluble dye reduction compounds (of vat or sulphur dyes), which exhaust from an aqueous alkaline bath on the fibre and then are fixed by oxidation in the water-insoluble form. Leuco compounds mostly have another hue than the oxidised, completed dyeing.

LEUCO VAT ESTER DYES
Leuco compounds of vat and sulphur dyes are unstable when special measures are not taken. Dyeing with vat dyes involves water-insoluble pigments which are made water-soluble only in alkaline reductive conditions. Leuco vat ester dyes are already water-soluble products with low substantivity in most cases. They are not complete dyes, but after being dyed, they must be developed into vat dyes on the fibre. In principle they are vat dyes which are esterified by a chemical transformation and thus made soluble. The working method is as follows: the goods are passed through a dye bath with leuco vat ester dye and sodium nitrite (calculated) and are padded. Then the fabric goes into a second bath containing sulphuric acid. Here, the leuco vat ester dyes are soaped into leuco vat dye. The sodium nitrite dragged in by the goods is converted to nitrous acid, which oxidises the leuco vat dye to a vat dye. The goods are then neutralised, soaped and processed to completion. The dyeings are indistinguishable from conventional vat dyeings.

LEVEL REGULATOR
Automatic regulating device for the level control of liquids, etc. which operate according to different processes: pressure sensor on the tank bottom or mechanically interrogating floating sensors.

LEVELLING AGENT
Through a temporary interaction with the dye, levelling agents increase their molecule size so that the complex diffuses more slowly into the fibre. Under the dyeing conditions in each case, they bring about a uniform distribution of the dyes in and on the textile goods. A differentiation is made between fibre-substantive and dye-substantive levelling agents.

LEVELLING POWER
The property of a dye to migrate from a place with higher concentration to one with low concentration. The levelling power depends on the time, temperature and the electrolyte and auxiliary additions.

LIGHT FASTNESS TESTING
The most important magnitude of influence among weathering factors is exposure to sunlight. The sun radiates a continuous spectrum consisting of UV radiation (wavelength < 380 nm), visible radiation (380 – 780 nm) and infrared heat radiation (> 780 nm). To use artificial sources of radiation in colorimetry and for testing purposes, the Comission International de l'Eclairage (CIE) has worked out global radiation distributions, the standard illuminant D65. Regarding the effectiveness of solar radiation, it must be kept in mind that the shortwave region of UV radiation is decisive in triggering photodegradation reactions in dyes and fibres even though it only accounts for about 5 % of global radiation. The type of radiation source (also related to UV radiation) combinated with the optical filter system is the decisive criterion for a rapid weathering device and the test results obtained with it. The radiation of the xenon gas-discharge lamp is regarded as the best possible technically feasible simulation of solar radiation. The following possibilities of light fastness testing are differentiated:

I. Exposure according to ISO 105-B02; the test specimens rotate at a distance of about 25 cm, arranged in a circle around the xenon arc lamp. A UV and an IR filter are positioned between the xenon arc lamp and the specimen holder. The exposure takes place at 35 °C and about 65 % relative humidity.

II. Weathering according to ISO 105-B04. During exposure, the specimens are sprayed with (ion-free) water for 1 min and dried for 29 min (without any heat being added).

LIGHT TENDERER
Under certain conditions during oxidation processes, some vat dyes tend to act as catalysts, whereby cellulose is partially degraded. A differentiation is made between bleaching, dyeing and light tenderers. The same dye does not exhibit the same behaviour in all three categories. There are no remedies against light tenderers.

L

LIQUOR LEVEL
Height or volume of liquor content in the dyeing tank.

LIQUOR APPLICATION
Application amount of treatment liquor on textile fabric. A differentiation is made in the application of dissolved products: minimum-liquor application, normal application and high moisture application. Spraying, foam and slop-padding lines are suitable for minimum-liquor application. Normal application is carried out by dye padders. The wetting operation can be intensified by immersion squeezing devices, steam locks connected to the trough, and vacuum impregnations.

LIQUOR RATIO (LR)
Ratio of the amount of goods [kg] to the liquor [l]. Each lowering of the LR saves time, water, waste water, energy and auxiliaries, but technical and technological limits exist.

LIQUOR STABILITY
Chemical and physical stability of dyebaths and other treatment liquors.

LIQUOR THROUGHPUT
Relation of liquor/amount of goods/time.

LOOSE STOCK
Fine, light, loose assembly of smooth or crimped individual fibres (naturally grown, cut or broken up). Mostly in a staple length of 30 – 150 mm.

LP
Abbreviation of Liquor pick-up, given as a percentage of the increase in weight after the padding process related to the dry weight.

M

MAGNESIA HARDNESS
(MgH), unit per degree of German Hardness of magnesium oxide (MgO) 7.15 mg/l water.

MAGNESIUM CHLORIDE
$MgCl_2$
Strongly hygroscopic;
used as a catalyst in resin finishing.

MARSEILLE SOAP
Soap made of unsaturated fatty acid with a low cloud point. For this reason, it is suitable for washing at low temperatures (20 – 30 °C).

MERCERISATION IN THE GREY
Mercerisation without previous kier boiling, boiling off, or any other wet treatment (dry mercerisation).

MERCERISING
Treatment of cotton yarns, woven fabrics or knitwear with cold, strong caustic soda solution under tension. The process is based on the observation that under the influence of alkaline solution, cotton swells/shrinks, increases in density and strength and shows an increased dye affinity. Mercerising is an important working step in cotton finishing to achieve a stable silky lustre and good handle. Yarn mercerisation is labour-intensive, and single-shade dyeings on yarn-mercerised knitwear are mostly unlevel and streaky. Mercerisation on fabrics is better. Mercerisation comprises the following steps: impregnation with alkaline solution, stentering, washing off under tension up to 7 °Bé, acidification. The degree of mercerisation is expressed by the so-called barite number. The stronger the cotton is mercerised, the more it absorbs barium hydroxide. The decisive factor in mercerisation is that the alkaline solution is washed off under tension. The following parameters are important: origin (has little influence on the mercerising effect), caustic soda solution concentration (the most effective solutions are of 28 – 32 °Bé, i.e. with a content of 270 – 330 g/l sodium hydroxide, which applies to the mercerisation of dry goods), the temperature (maximum swelling of CO takes place at 12 – 15 °C – a strong initial swelling of the edge zones prevents further penetration of the alkaline solution into the interior of the fibre; hot mercerisation at 50 – 60 °C brings less swelling, but complete penetration of the yarn, by which optimum lustre is achieved) the time (usual values are 30 – 60 s reaction time; the faster the alkaline solution penetrates the fibre interior, the shorter the time can be; here, suitable wetting agents or high alkaline solution temperatures or entering the goods at a high temperature in the alkaline solution. Thermex process) and the tension (maximum mercerising effect obtained by washing off under tension).

METAMERISM
A pair of colour patterns can show the same tristimulus value under a given illuminant, i.e. the same colour appearance even though the spectral curves are different. If the light source is changed, a more or less distinct difference in colour between the two patterns results. Such a case of metamerism is, above all, due to different dye combinations. The metamerism index is worked out via the calculation of the colour difference under a defined type of test illuminant on the assumption that, with the type of reference illuminant selected, the pair of patterns shows no colour difference. If this is not the case, appropriate corrections are calculated. Metamerism can occur not only with different illuminants but also with different observers or different positioning of the patterns.

METRIC COUNT (NM)
A measurement-related length for designating the fineness of textile fibres and yarns. A higher number corresponds to a comparatively finer yarn; however, as this system is opposed to the text system (where a large number indicates thick yarn) and also because designation Nm can be confused with Nm = Newton · metre, the metric count should no longer be used.

MIGRATION
The capacity of a substance in or on the substrate to migrate from places of higher concentration to places of lower concentration. Migration examples: levelling-out during the dyeing process, uneven drying in padding processes, on contact of dyeings or prints with substrates which have an affinity to the dyed substrate (e.g. disperse dyeing in a PVC coating).

MIGRATION PREVENTER
Substance added to the padding liquor to prevent migration of the dyes on drying (MIGRASOL SAP).

M

MINIMUM-LIQUOR APPLICATION

(MA), Application of finishing liquors to textiles without excess liquor which would have to be removed. The aim is mainly to achieve capillary saturation (e.g. cotton approx. 35 % liquor load, generally < 40 %). For reasons of lowering energy costs, MA has become more important. There are also qualitative advantages. For example, MA application of resin finishing chemicals on CO woven fabrics prevents the migration of wetting agents in the water on the fabric surface, and thus an uneven wetting effect through the cross-section of the fabric because less water must be evaporated on drying.

MOIRÉ EFFECTS

Caused by the interference of two linear systems. Carried out mostly with lightly ribbed fabric with imprinted (lustrous) pattern effects in taffeta, brocade or twill. Besides these desired moiré effects there is also undesired moiré which is considered a defect. This occurs, for example, by uneven heat-setting of the goods, on the beam etc. regular or irregular, cloudy printed places in woven fabric with more or less lustre. Undesired moiré effects can also occur in lamination when the type and number of picks are unfavourably combined.

MOISTURE ABSORPTION

Approximate mean moisture values in % at 65 % relative humidity and 20 °C.

MULTIFIBRE

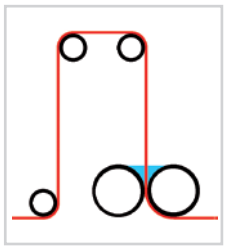
Mixed fibre stripes mainly consisting of CV, PAC, PES, PA, CO, CTA or WO, PAC, PES, PA, CO, CA. Used for wet fastness tests to prove staining behaviour.

N

NEPS
Cotton defect in the form of felted-together fibre knots, as growth neps (husk residues, immature and dead cotton, wetness results) or procesing neps (torn-apart and twisted together, mainly mature fibres which develop on the carding machine).

NEUTRALISATION
Mutual saturation of acid and base to neutral reaction pH = 7 (levelling of H and OH ion concentration). The result is a neutral salt. This is however not the essential feature, which is the H and OH ion levelling "to water".

NIP PAD DYER
Horizontal 2-bowl pad dyer, where the fabric enters from above and the padding liquor is held between two squeezing rollers (in the nip).



Pad dyer with Nip point trough

NONIONIC
Forming no ions

NONIONIC SURFACE-ACTIVE SUBSTANCES
Nonionic surfactants, surface-active substances which do not form ions in an aqueous solution. The water solubility is caused by functional groups which have a strong affinity to water. One of their most important fields of application is their use as the raw material basis for detergents and cleaning agents. With a constant hydrophobic chain, the pure surfactant properties such as foaming power, wetting effect, emulsifying power, dispersing effect and also solubility etc. increase along with a rising degree of ethoxylation until they either reach a plateau or fall again (e.g. washing effect). Along with etheneoxide-propeneoxide-block polymerisation types, there are nonionic surfactants consisting of end group-sealed fatty alcohol oxylates (the free OH group at the end of the alkoxylate chain is blocked by suitable chemical conversion so that the low foaming and the surfactant properties with little colour remain intact). Low-foaming surfactants exhibit low cloud points as they exhibit their low foaming property only above the cloud point.

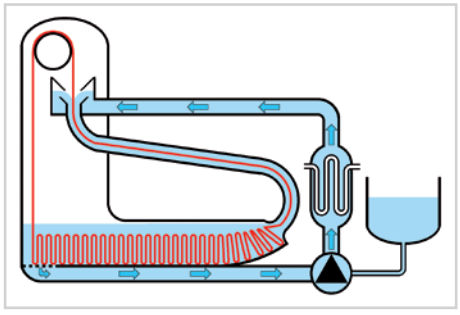
O

ÖKO (ECO) LABEL
An eco-label with substantiated, verifiable criteria conveys motivation for ecological optimisation of textile goods in the industry, security to the trade, and trust in the purchased textile to the consumer.

ÖKO-TEX STANDARD 100
Based on the following criteria: the textile goods are free of hazardous substances and compatible with the skin; the production (fibre production, manufacture of the textile goods, finishing, garment manufacturing) is free from defects; simple disposability of the textile through recycling, decomposition or incineration.

OVER-DRYING
Excessive drying of a fibre material so that even the capillary water component is removed. Heat and over-drying damage all textiles to a greater or lesser extent. This can result in thermal splitting of polymer chains.

OVERFLOW
Rope-dyeing machine for woven and knitted fabrics, especially for sensitive types. One disadvantage of semi-flooded machines, which are now almost to be regarded as classic, lies in the still over-high liquor ratios. Depending on the goods to be dyed, different capacities per batch can be dyed in the various machine types (125 kg, 150 kg, 200 kg, 300 kg).



Overflow

OVER-OXIDATION
The factors of over-oxidation are an excessively high pH value, overly high peroxide concentration, excessively high temperature, or a combination of these. This can lead to greening or dull shades. Especially sensitive are blue dyes of the BEZATHREN Blue RS type. In exhaust dyeing this problem can be avoided by using MEROPAN XRN instead of hydrogen peroxide. MEROPAN XRN is not pH-sensitive. Over-oxidation can be neutralised by a treatment with a blank vat.

OVER-REDUCTION
An undesired property of certain vat dyes with the use of an excessively high dyeing temperature, too high an amount of sodium dithionite, too long dyeing time, or a combination of these factors. Especially sensitive are blue dyes of the BEZATHREN RS type. Over-reduction leads to loss of strength, duller shades and in some cases to lower chlorine fastness. Over-reduction is irreversible.

OXIDATION
Oxidation is a chemical reaction. The substance to be oxidised releases electrons to the oxidation agent. Opposite of: Reduction.

OXIDATION AGENT
Cause oxidation of the reacting agent by means of electron uptake. Use of oxidation agents: during oxidation bleaching, as oxidative starch hydrolising products, for oxidation/after-soaping of fast dyes (vat, sulphur, naphthol).

OXYCELLULOSE
Oxidation-damaged cellulose (degraded to a greater or lesser extent though oxidative acids, bleaching agents); properties similar to hydrocellulose and photocellulose; proof: oxycellulose alone with Berlin blue, Fehling's solution, methylene blue and vatting test – like hydrocellulose.

P

PACK DYEING MACHINE

A circulating-liquor dyeing machine where the treatment liquor is circulated through the immobile textile goods.

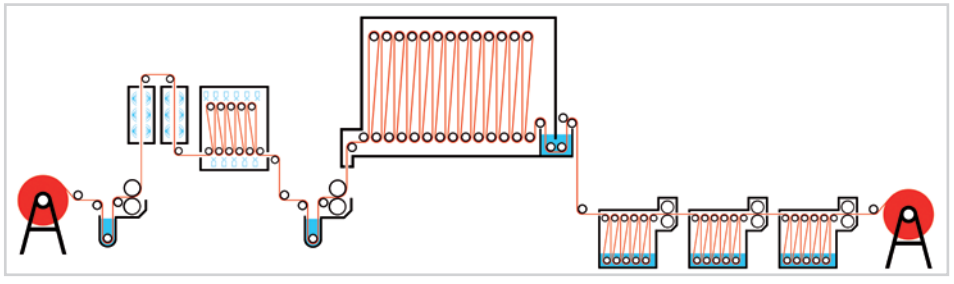
PAD (DRY PAD) STEAM PROCESS

Carried out with a pad dyer in combination with a (steam) fixation apparatus. The demands on the dyeing pad dyer are especially high as every irregularity results in unlevelness. The important elements are constant fabric speed together with as long and constant as possible length of immersion with the least possible liquor volume. It is better to have a constant, fresh liquor flow into the trough than to allow it to constantly circulate between the trough and the feed tank. With heavy, tightly woven fabrics, double immersion is advantageous. The fabric speed through the pad dyer is generally 40 – 50 m/min with immersion times of 1 – 2 s for wool and 3 – 4 s for regenerated cellulose. With increasing speed, the equilibrium of the fabric surface decreases. Further decisive factors for even dyeing results after padding are: constant squeezing effect (linear, convex, or concave, depending on the fabric structure and absorbency); preventing drying-out of the selvedge areas (darker dyeing results); uniform pre-treatment of the goods (absorbency, residual moisture, etc.).

Following the padding operation, the pad steam and pad dry pad steam processes differ from each other. The latter is characterised by a drying step after the dye padding and subsequent chemical pad and steam fixation. The dyeing process with a drying step is decisive for the application of migration inhibitors to prevent dye migration on drying and to achieve level appearance of the goods. In the subsequent steaming treatment (fixation), attention must be paid to the temperature uniformity. In saturated steam equipment, fewer differences occur than with superheated steam. Steaming plays a decisive role in dye fixation. In order to permit the reduction of the dyes, the goods are rapidly heated in an air-free steamer. The now-soluble dyes then migrate from the liquor into the fibres.

After short rinsing, the oxidation follows directly the steaming process. The oxidation is carried out with acetic acid and hydrogen peroxide. This is important in order to avoid a rapid decomposition of peroxide due to the imported alkali. A problem with all continuous dyeing machines for vat dyes is the soaping operation. In order to achieve a sufficiently long soaping time, depending on the fabric speed it may be necessary to set several compartments with soap.

Which of the possible pad steam processes will be used, with or without intermediate drying, depends on the type and amount of the goods, the dye properties, and the possibilities of the individual finishing plant. The pad dry pad steam process is generally recommended for plants with complete continuous ranges and high production. The wet steam process is interesting for saving on drying costs, for high flexibility and high production. However, this process is recommended only for light to medium shades, as the build-up capacity is limited compared to processes with an intermediate drying step.

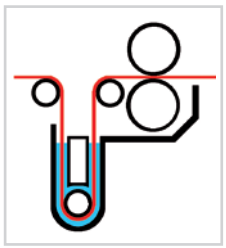


Pad Dry Pad Steam machine

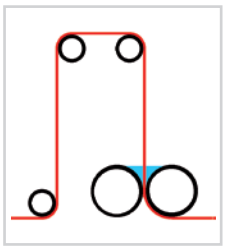
P

PAD DYER

The purpose of the pad dyer is to remove the excess liquor uniformly taken up by the fabric from the dyeing trough along the entire width. A differentiation is made between a trough with squeezing rollers and a trough-less high-performance (nip) pad dyer.



Pad dyer with trough



Pad dyer with nip point trough

PAD JIGGER PROCESS

Piece goods are padded with dye solutions and developed on the jigger. This method has been developed above all for dyeing cotton with vat dyes. It ensures good dye penetration. Since a portion of the dye is converted into the blank vat, the discontinuous vatting in the full bath of the jigger can result in tailing. This defect can be prevented by adding padding liquor to the bath at the beginning and end of the first passage.

PADDING

Impregnation of piece goods on the padder with dyes or chemicals.

PADDING AUXILIARIES

These have the following purposes in the padding of fabrics: increasing the wetting and dye penetration capacity, little to no influence on the degree of the distribution of pigments, prevention of pigment migration during intermediate drying of the pigmented goods, low foam development in the padding liquor, adequate stability to electrolytes or alkali.

PARTICLE SIZE

Refers to dye particles; important especially with water-insoluble dyes.

PASSAGE

Also called end or run; one complete revolution of the goods through the jigger.

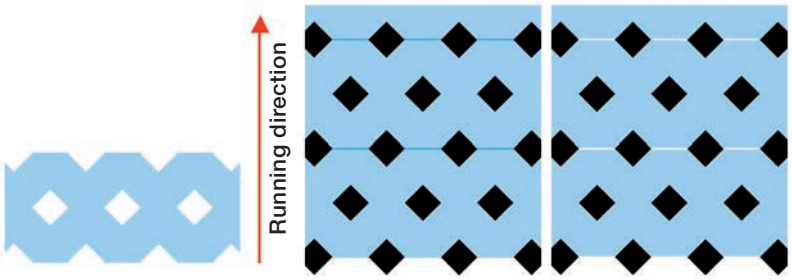
PASS-FAIL COLOUR QUALITY CONTROL

Pass-fail is determined based on objective colour tolerance values whether the tested colour lies within or outside the tolerated limit. The criteria are deviations in the luminosity and hue based on the Lab values.

PATTERN CONTINUATION

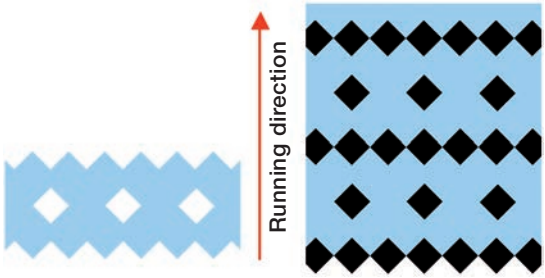
In discontinuous printing processes like flat screen printing, pattern continuation plays a decisive role in technical production terms. In flat screen printing, the pattern is produced by adding sections lengthwise. In order to prevent blank spaces where the screens are joined, prints are slightly overlapped. With colours of the same depth, these overlapping areas are visible. As a result, patterns with a continuous single-colour lengthwise blotch print cannot be produced by application printing.

Print appearance of a blotch pattern without pattern continuation:



Blotch print screen | Printing result with overlap (darker areas) | Printing result without overlap (blank spaces)

Print appearance of a blotch pattern with pattern continuation:



Blotch print screen | Printing result with overlap

If the overall colouration permits, single-colour blotch prints can be applied to dyed goods without pattern continuation. Discharge and resist printing processes provide further possibilities.

P

PENETRATION
Penetration of a fibre structure by the applied liquor, which must wet all the surfaces as much as possible, so that the levelness of the product application is ensured before the fixation treatment.

PERFORATION
Systematic perforation of materials to allow substances to pass through them. Thus dyeing bobbins or dye beams are perforated so that the dye liquor can enter into a liquor exchange with the goods to be dyed.

PEROXIDE
(Superoxide); compounds of the hydrogen peroxide, sodium peroxide and magnesium peroxide type; oxygen-releasing principle; oxidation agent (hydrogen peroxide is often used in peroxide bleaching, which has advantages over other bleaching variants from the technical application and ecological standpoint); the activation of the peroxide bleach with hydrogen peroxide is carried out with alkali. Sodium hypochlorite (NaOCl) or sodium chlorite ($NaClO_2$) exhibit serious ecological disadvantages in terms of exhaust air pollution by developing toxic gases or waste water pollution (AOX).

Hydrogen peroxide measurement:
Prepare 100 ml distilled water
Add approx. 20 ml sulphuric acid (20 %)
Add exactly 10 ml of the hydrogen peroxide bath
Titrate with 0.1 N $KMnO_4$ until mixture changes from colourless to red

Calculation:
Consumption of ml:
0,1 N $KMnO_4$ x 0,43 = ml H_2O_2 35 %
Consumption of ml:
0,1 N $KMnO_4$ x 0,28 = ml H_2O_2 50 %
Consumption of ml:
0,1 N $KMnO_4$ x 0,17 = g H_2O_2 100 %

PEROXIDE BLEACHING FASTNESS
Stability of the colour to peroxide-containing bleaching liquors.

PERSPIRATION FASTNESS
ISO 105-E04; stability of dyeings to artificial perspiration (acid, alkaline).

PERSPIRATION LIGHT FASTNESS
DIN EN ISO 105-B07: Test method tests the resistance of coloured textiles to light influence from xenon arc lamps under simultaneous application of a synthetic perspiration solution (acidic and alkaline).

PERSPIROMETER
Device for testing wet general use fastness properties (perspiration and water fastness). The test specimen is placed between glass or acrylic resin plates and then placed in the device and treated under defined pressure at the prescribed temperature for the prescribed time.

PHOSPHORIC ACID
H_3PO_4
Medium-strength acid;
used as a catalyst in resin finishing.

PHOTOCHROMISM/PHOTOTROPY
Temporary shade change of coloured textiles due to the influence of light. The effect of light on dyeings with azo dyes on cellulosic fibres can cause reversible and irreversible changes in the dye molecule. Photochromism refers only to reversible changes, i.e. shade changes which return to the original shade in the dark. On exposure to illumination, azo dyes can pass from the trans-form to the cis-form. The higher-energy cis-form is unstable to a greater or lesser extent and returns to the more stable trans-form in the dark. Photochromism also occurs with certain vat anthraquinone dyes. The resulting dehydration of the cellulose is not connected to the damage to the fibre. Dyes also display a tendency to photochromism in the presence of finishing agents (of the N-methylol compound type) and water-repellent agents (siloxanes).

PHOTOMETER
See colour measuring device.

PICK-UP
Liquor pick-up (LP) in %.

PIGMENT
Practically insoluble, solid, finely dispersed colorant which in fine dispersion produces a coloured appearance; insoluble dyes are called pigments.

PIGMENTATION
Unvatted vat dyes are padded on the goods as a dispersion and, upon drying, they are deposited on the fibres as pigments. A later chemical pad vats the dye to a solution which, on subsequent steaming, diffuses into the fibre.

POTASH
See potassium carbonate.

P

POTASSIUM CARBONATE

K_2CO_3

Aqueous solutions are strongly alkaline. Strongly hygroscopic.

Used to adjust the pH.

PRECISION WINDING OF CROSS-WOUND YARN PACKAGES

In all diameters, these always exhibit a regular winding. The winding bobbin is positively driven and always stands in an adjustable, constant relation to the movement of the thread guide. The thread space can also be selected. The number of windings per traverse stroke remains constant from the initial to the full package diameter.

PRE-DRYING

By a mild drying treatment, migration in the main drier is prevented. Pre-drying in the IR zone to 25 – 30 % residual moisture.

PRE-PIGMENTATION PROCESS

In the pre-pigmentation process, distributes non-substantive pigments over the dyegoods in the initial phase before being subsequently fixed.

PRE-TREATMENT

All processes for improving the wetting and absorbency, dye uptake capacity, the cleanness of the textile material, increasing the degree of whiteness and for improving fabric winding, i.e. the relaxing and structuring properties. At the same time, tension and material irregularities from previous weaving and knitting processes must be levelled out.

PROCESSING FASTNESS PROPERTIES

The sum of the fastness properties required of dyed materials by reason of further processing.

PROFESSIONAL WEAR

A category of textiles which must meet especially high requirements. They must exhibit high stability and durability in order to withstand the high mechanical stresses to which they are exposed in most fields of application. Their easy-care and care-stability properties are also immediately associated with their economy. In most cases, it is no longer possible to clean these hygienically by domestic laundering. Instead, it must be carried out by industrial laundries or by dry cleaning.

PROOF OF IRON

Carried out with hydrochloric acid and subsequent addition of:

a) Potassium hexacyanoferrate (II)-solution = blue colouration (> Berlin blue) or

b) Ammonium thiocyanate or potassium thiocyanate solution = blood-red colouration with iron.

R

RED/GREEN TEST

Goldthwait test:
To do this, the raw cotton is dyed with 0.8 % C. I. Direct Red 81 and 1.8 % C. I. Direct Green 26 for 15 minutes at boiling temperature. Then 5 % common salt is added in two portions, 15 minutes apart. After another 15 minutes of dyeing time, the cotton is cold-rinsed twice, then for 30 seconds at boiling temperature and again twice cold. The cotton is squeezed and air dried. The immature cotton shows a green dyeing and mature cotton red staining.

REDOX POTENTIAL (r_H)

"Redox" is the abbreviation of **Red**uction **Ox**idation. The redox potential is a measure for rating reduction and oxidation processes in solutions where the electric potential is measured in volts/millivolts. A graduated scale results which corresponds to the different strengths of the reduction effect, its reaction speed and the often heavy dependence on the momentary pH value, which is based on the r_H. The redox potential gives no indication of the speed. The redox tension is induced by the oxidative and reductive substances dissolving in water, provided these are effective on the electrode surface. Redox tension is given as the tension between an inert electrode conductor and the standard hydrogen electrode. If the amount of hydro falls below a certain quantity, the vat potential falls to the leuco potential of the vat dye. The difference between leuco and vat potential is at least 100 mV. If the potential vat combinations fall to the leuco potential of the components with the highest leuco potential, then the reduction agent is used up. The r_H determines the reduction or oxidation power of a solution. It is brought about by the electric tension which a precious metal (Pt) takes on with respect to a solution of an oxidation agent or a reduction agent. The potential (tension) depends on the reduction or oxidation power of the solution, the pH and the temperature. In comparative tests, the r_H value is measured with the greatest precision at the same pH value, mostly pH 7.

Redox scale:
r_H 0 is the potential of the standard-hydrogen electrode
r_H 42 is that of the oxygen electrode
r_H <17 is designated as reductive
r_H >25 is designated as oxidative
The r_H-measurement is electrometrically carried out by calculating the potential.

Measurement:
pH-measuring equipment can be used. It is essential for the measurement that, at the same pH, both the potential of the solution to be tested as well as that of a neither reductive nor oxidative liquid is determined. Dividing the value obtained by 0.03 gives the appropriate r_H value.

Reduction range		Neutral range	Oxidation range	
← 0 – 8,5 →	← 8,5 – 17 →	← 17 – 25 →	← 25 – 34 →	← 34 – 42 →
strong	weak	indifferent	weak	strong
Sodium dithionite	Sodium hydrogen sulphite Sodium thiosulphate	Water Hydrochloric acid Caustic lye	Iodine solution	Potassium dichromate Potassium permanganate Bleaching solution, Ozone

REDUCTION

Reduction is a chemical reaction. The compound which is reduced accepts electrons from the reducing agent. Opposite of: oxidation.

REDUCTION AGENT

Causes by donation of electrons a reduction of the reaction partner. Reduction agents must reduce both the dye in vat dyeings and also remove the oxygen present in the dyebath and subsequently released during the dyeing. The required reduction potential

R

from -500 mV to -1000 mV depending on the dye, must remain intact during the entire treatment time so that on total, relatively high reduction agent surpluses are required.

tives. In order to increase the fastness and effectiveness of a finish, it is advisable to test the chemical reaction of the finishing chemicals with one another or with the fibre.

Reduction agent	Advantages	Disadvantages
Sodium dithionite $Na_2S_2O_4$ „Hydro“	– sufficient reduction potential for vat, sulphur and indigo dyes – good liquor stability of the vatted liquor	– waste water polluting (inhibits biodegradation of the waste water and leads to heavy oxygen depletion) – overreduction at higher dyeing temperatures as well as changes of shade – expensive storage (safety)
Sulfinic acid derivative	– sufficient reduction potential – especially suitable for HT dyeing – good air stability	– potentially heavily dependent on temperature
Hydroxy acetone CH_3COCH_2OH	– biodegradable – easy metering (liquid) – relatively stable	– does not reach the required reduction potential for vat dyes (especially suitable for indigo and sulphur dyes) – unpleasant odour – expensive to produce (price)
Sodium sulphide Sodium hydrogen sulphide Na_2S, NaHS	– cheap	– unpleasant odour due to hydrogen sulphide – toxic – low reduction potential (especially suitable for sulphur dyes) – high application amounts required
Glucose	– no environmental pollution – cheap – non-toxic	– low reduction potential (especially suitable for sulphur dyes) – only at dyeing temperatures around 90 °C

RESIDUAL MOISTURE CONTENT

The residual moisture content is an important factor in continuous dyeing. After the fabric leaves the pad dyer, the padding liquor is evenly distributed over the goods. To avoid undesired migration of the dye, the fabric is pre-dried in an IR zone before the actual drying process. In the intermediate drying of the padded goods, the migration of the colour pigment must be prevented as much as possible. The migration ends when the fabric is so far dried that the connection of the liquid phase is discontinued. This is the case with cellulosic fibres when about 30 % residual moisture is reached. It is additionally recommended to add migration preventers to the padding liquor.

RESIN FINISHING

Imparts additional properties depending on the requirement profile. Finish to increase the general use properties. Thanks to resin finishing, especially with textiles made of natural cellulose, there is a greater or lesser reduction of the abrasion, tensile strength and tear propagation fastness. However, these values can be kept within tolerable limits, e.g. by the type and amount of the resin finishing agent, the processing technology and using addi-

RETARDING

Slowing, braking, decelerating; e.g. of the dye uptake rate, which with all dyes involved is carried out in the sense of a levelling process. This however can have a selective effect on certain dyes which can then interfere with the levelling of such dye combinations. Excessively high application amounts of levelling agents can impede the dye in the dyebath.

ROLLER HARDNESS

With rubber or plastic rollers for finishing machines, among other things the hardness/softness is designated according to different evaluation scales.
Remark: °Shore hardness and DVM softness are opposed to each other and are handled differently in some cases!

ROPE DYEING MACHINE

Dyeing machine where the textile fabric is dyed in rope form, e.g. on jet or overflow machines.

R

RUBBING FASTNESS

Colour resistance for textiles of all types to rubbing and rubbing off of other textiles in normal use. Tested with the Crockmeter according to ISO 105-X12, wet and dry. The rubbing fastness levels are less dependent on the dye and more on the substrate and the shade depth. It should be whether the rubbed-off material consists of the colour pigment or fibre components.

Vat:
Poor rubbing fastness of vat dyeings can be caused by:

- Imported earth alkali from the substrate or process water
- Insufficient state of reduction of the vat at the end of the steaming process (to be checked with yellow paper at the end of the steamer)
- Insufficient rinsing before the oxidation
- Softeners in the finish

Pigment:
Poor rubbing fastness of pigment dyeings can be caused by:

- Not optimised pigment system
- Insufficient curing
- Softeners in the finish

RUNNING CREASES

Troublesome lengthwise markings; problem occurs while finishing woven and knitted fabrics, especially when dyeing in rope form at higher temperatures. In industrial practice it has been found that crease inhibitors can reduce the defect. During impregnation treatments with plaiting, creasing either occurs in the pad dyer, during plaiting, in the steamer or afterwards when stacking.

S

SATURATED STEAM

Steam encountering water, which can absorb no more water.

°C	bar	°C	bar
91	0,7289	104	1,1678
92	0,7568	106	1,2515
93	0,7857	108	1,3401
94	0,8154	110	1,4338
95	0,8461	120	1,9867
96	0,8777	130	2,7026
97	0,9103	140	3,6150
98	0,9439	150	4,7610
99	0,9785	160	6,1814
100	1,0142	170	7,9205
102	1,0887	180	10,0263

SATURATION VALUE

A fibre's maximum absorbency amount of dye and possibly of auxiliary.

SELF-COLOUR

Inherent colour of the textile material to be dyed, before it is dyed. This must be taken into account in the recipe formulation.

SEMI-CONTINUOUS PROCESSES

A finishing process that combines a continuous processing step (e.g. padding) and a discontinuous one (e.g. development on the jigger).

SEMI-PIGMENTATION PROCESS

Principle: The dyeing liquor consists of finely dispersed dye, alkali and hydro sulphite, is prepared at a cold temperature, and is then heated to vatting temperature.

SEQUESTERING AGENT

Designation of chemical compounds which take multivalent metal ions out of water and bind them into an anionic (chelate complex, e.g. polyphosphates, ethylenediaminetetraacetic acid [EDTA]). For ecological reasons, inorganic polyphosphates are now rarely used. Certain types, thanks to their dispersing effect, increase the anti-redeposition power of surfactant liquors thus counteracting possible greying and hardening of the textiles due to the re-deposition of soil.

SHADE IN ARTIFICIAL LIGHT

The visual change of the same dyed shade when viewed in a different light (standard illuminants). In artificial light, some shades reflect in another wavelength range than they do in daylight.

SHADING

Tinting, covering, brightening; after-treatment of a nearly completed dyeing with dyes to match the desired shade pattern.

SHOCK OXIDATION

Oxidation variant without previous rinsing from a fresh bath or directly in the dyebath.

SLOP PADDING

Liquor application system.

SODA

See sodium carbonate.

SODIUM CARBONATE

Na_2CO_3

Aqueous solutions are strongly alkaline; used to adjust the pH.

SODIUM DITHIONITE

(Sodium hydrosulphite, sodium hypodisulphite); $Na_2S_2O_4$; white, anhydrous powder; only completely dry and cold storage-stable; well water-soluble; solution readily decomposes to sodium sulphite and sodium sulphate; strongly reductive; alkaline solution strongly attracts oxygen; used as reduction agent in vat dyeing; also known as hydrosulphite.

SODIUM DITHIONITE MEASUREMENT

Hydrosulphite measurement:
Prepare 100 ml distilled water
Add 1.5 ml formaldehyde 40 %
Add liquor sample (precisely):
with more than 10 g/l hydrosulphite = 2 ml liquor
with less than 10 g/l hydrosulphite = 5 ml liquor
2 ml acetic acid 20 %
Allow to stand for 1 – 2 min.
Add a few drops starch solution (3 %).
Titrate with 0.1 n iodine solution until colour turns blue.

Calculation:
Consumption of ml 0.1 n iodine solution
With 2 ml liquor sample:
x 2.5 = ... g/l hydrosulphite
With 5 ml liquor sample:
x 1.0 = ... g/l hydrosulphite

S

SODIUM HYDROXIDE
NaOH
(caustic soda, soda lye, caustic soda solution) Hygroscopic; draws CO_2 from the air (forming sodium carbonate); water-soluble; strong formation of heat on dissolving (exothermal).

SODIUM NITRITE
$NaNO_2$
(Nitrite, nitrous sodium) Weakly hygroscopic; readily water-soluble; used to prevent over-reduction with vat dyes between 60 – 80 °C.

SODIUM PERSULPHATE
$Na_2S_2O_8$
Oxidation agent.

SODIUM SILICATE
Mixture of Na_2SiO_3 and $Na_2Si_2O_5$.
Stabilizer in peroxide bleaching.

SODIUM SULPHATE
Na_2SO_4
Glauber salt.

SODIUM TETRABORATE
$Na_2B_4O_7 \cdot 10H_2O$
(Borax)
Aqueous solutions are alkaline.
Coagulation of guar ethers thickeners.

SOIL-RELEASE FINISH
Application of certain finishing processes to achieve better washing-off of soil and spots. The chemical basis of well-known soil-release products are:
- Silicon compounds
- Carboxymethylcelluloses
- Ethoxylated compounds
- Polyglycolesters of terephthalic acid
- Acrylic acid polymers
- Fluorochemicals

They are often applied in combination with resin finishing products under the specific conditions for crosslinking agents. In most cases, there are no specific application conditions required for these products alone. The permanence depends on the product. Good results are obtained with oil-repellent/hydrophilic fluorochemicals.

SOLUBILITY
The solubility in a certain solvent depends on the arrangement, the number and kind of hydrophilic and -phobic groups in the molecule. In principle: like dissolves like.

SOLUTION
A true solution is the uniform distribution of one substance in another (through diffusion) or, according to Pauling, a phase consisting of several particles which cannot be converted into each other easily. The main component of a solution is the solvent, whereas the other components are designated dissolved substances. The types of solution are the following: gas in gas (gaseous), gas or liquid in a liquid medium, solid substances (salts) in liquids – depending on the temperature (at maximum solubility or saturation = a saturated solution, as opposed to an unsaturated, diluted solution), or solids in solid substances (e.g. alloys of metals and also polyester dyeings with disperse dyes).

SPECKS
Poorly dissolved or inadequately dispersed dye, but precipitations based on inadequate product compatibility can also form deposits on the goods called specks.

STAINING
Soiling of white adjacent fibres in fastness tests or of adjacent white or coloured fibres during wet finishing processes.

STANDARD CLIMATE
In DIN EN ISO 139, the standard climate for textile testing has been defined as 65 % ± 2 % relative humidity and 20 °C ± 2 °C room temperature.

STANDARD DEPTH (SD)
(Auxiliary standards); the auxiliary standard scale according to DIN EN ISO 105-A01 has about 20 shades in the following standard depths (on lustrous and matte woven fabric for standard illuminant C): 2/1, 1/1, 1/3, 1/6, 1/12, 1/25, Navy pale and dark, Black pale and dark. They are used to facilitate visual evaluation.

STATE OF REDUCTION OF THE VAT
The correct composition of a vat is called a "good state". If either sodium dithionite or caustic soda solution (or both) is lacking, partial oxidation sets in, and in some cases the dye precipitates and the vat becomes dull, i.e. it is in a „a bad state“. Even without dye precipitation, a vat in a poor state produces unlevel dyeings. There must always be enough reduction agent available so as to

S

keep the vat in the good state during the dyeing process. Measurement with yellow paper indicates this (colour changes to blue when the vat is good) as does checking the vat colour of a dye and the corresponding vat acid in each case. This is formed after too much alkali is used up and the pH falls below 12. As its oxidation takes place only with difficulty, oxidation spots result.

SUBSTANTIVITY

The expression of the absorbing (exhausting) power of a dye or auxiliary, i.e. its ability to be applied to a textile as a liquid medium. However, the expression for the force with which a dye/auxiliary is held by the substrate is designated as the affinity.

SUPERHEATED STEAM

This is 100 % steam whose temperature is above that of saturated steam. This steam is not saturated.

SWIMMING ROLLER

(S-roller); construction of a roller which floats on a cushion of compressed oil. Rollers with the possibility of deflection correction can be used to correct material-induced differences (fabric structure, absorbency, etc.) in the liquor pick-up. These corrections were formerly possible with cambered or slant-adjusted rollers. S-rollers (Küsters) have been on the market since 1956. The interplay of oil chamber and pivot pressure can deflect any S-roller positively or negatively or, with even pressure, make it follow any bending line of a conventional roller. There are many processes that permit the use of an S-roller. This applies to water extraction, the application of invisible or only barely visible substances in the treatment of pile goods or printed articles, and in cold dyeing with rolling up. The situation is different with rapid-reaction processes such as the hot flue, a steamer, or when drying. Here, both rollers must be the same in hardness, type, diameter and roller positioning. Examples of this are dyeing padders with two horizontal S-rollers. These rollers form a sensitive juncture. This is made possible by the mutual bending behaviour of both rollers. With the combination of a conventional and an adjustable roller, the former deflects under pressure. To keep the amount of deflection to a minimum, these rollers must have a defined diameter. For this reason, the combination of a rigid and a high-elasticity roller is opposed to the principle of an ideal juncture. With two S-rollers on the other hand, the deflection-controlled values of both rollers complement each other additively. If the squeezing effect of finishing processes are especially uniform, it is recommended to use a swimming roller and a conventional one positioned vertically.

T

TAILING

I. Difference in shade depth between the beginning/end and the middle of a dyebatch after padding.

II. If the pad dyer does not have the optimum mixing action or has a very high trough volume, tailing (change of shade depth between the beginning and end of a fabric) can generally occur. In the case of vat dyeing, tailing occurs mainly in the chemical pad. When the pigmented goods (with or without intermediate drying) are passed through the chemical padding liquor, a portion of the dye goes from the surface back into the bath. In such cases, to prevent concentration differences between the dye on the fibre and dye in the bath from the beginning, a portion of the dye padding liquor is added to the chemical padding liquor. This way, undesired brighter beginning portions of a batch caused by the partial washing-off of the dye are avoided.

TENDENCY TO CREASING

See crease recovery angle.

TENSILE STRENGTH

(Strength, tenacity, breaking strength, limit strength, tear strength); resistance of a material to tensile stress; the tensile strength is a fineness-related tensile force. In the SI system, the tensile strength corresponds to the measured tensile strength in Newtons divided by the fibre fineness in tex.

TEX SYSTEM

For designation of the linear mass (see fineness designation) of textile fibres, intermediate products, yarns and twisted yarns.
1 tex is the fineness at which a fibre/yarn of 1 km length weighs 1 g (1 tex = 1 g/km).

THERMOMIGRATION

Desorption as the migration of dyes, especially disperse dyes on PES, under the influence of dry heat in the presence of surfactants. In thermal after-treatments of dyed polyester fibres (drying, post-fixation, finishing), the disperse dye can migrate to the surface. Thermomigrated disperse dyes are no longer fixed and therefore reduce the fastness level.

THERMOSOLING

Treatment which, by means of hot air, superheated steam, contact heat or radiation, causes the dye to diffuse into the interior of the fibre. With thermosoling, it is important that the fabric is exposed to a constant temperature over the entire width as temperature fluctuations can lead to shade differences.

TROUGH

Dye liquor tank in the pad dyer, liquor tanks in sizing and finishing machines.

U

UREA

NH_2CONH_2

Can improve the solubility of dyes. Prevents the clogging/drying of the screen in the pigment printing system and reduces the formaldehyde content on the goods (measured according to Law 112).

V

VAT

I. Alkaline sodium dithionite solution without dye (blank vat) or with vat dye (dyeing vat). In the latter case, the leuco compound of the inherently water-insoluble vat dye is present, which is applied to the fibre in this form.
II. Originally the term "vat" was the designation of a wooden tub used for fermenting indigo.

VAT ACID

While the dye is converted into its sodium leuco compound, the carbonyl groups >C=O are reduced to the >C-ONa groups. Only in this form does the dye have the capacity to be absorbed by the fibre, i.e. have substantivity. Below pH12, the Na-leuco compound forms the free leuco compound which is the vat acid. The vat and vat acid often exhibit different colours. Vat acid has very little or no substantivity, is more difficult to dissolve, and in most cases is more difficult to oxidise.

VAT DYE

Water-insoluble dye with at least one keto group >C=O. Most vat dyes are quinone derivatives which, in an alkaline solution with reduction agent via compounds similar to hydroquinone HO-C_6H_4-OH (vat acid), are converted to their sodium salts. In this form, the so-called leuco compound, vat dyes are water-soluble and are absorbed by the fibres. Vat dyes are applied in the form of powder, paste or liquid in continuous and exhaust dyeing as well as in printing. After their uptake by the fibre, they are converted back to the insoluble quinone dye by reoxidation. Their insolubility then ensures the high wet fastness properties for which vat dyes are well known. A subsequent after-soaping treatment is necessary for the correct development of the shade and for optimum fastness properties. Depending on their constitution, vat dyes are classified as anthraquinoid and indigoid, the latter no longer being important.

VATTING

Conversion of a vat dye from the water-insoluble state to a water-soluble leuco compound by means of reduction, mostly with NaOH and sodium dithionite.

W

WARM DYEING DYES

Warm dyeing vat dyes according to the BW-process.

WASHING

In washing processes, unwanted substances are washed off from the substrate by dissolving or dispersing them in water. A wash-process is a combination of the four following physical-chemical factors:

- Chemistry
- Mechanics
- Temperature
- Time

There are three different kinds of washing-procedures:

1. Dissolution-washing:
   The substances on the fibres are water-soluble (e.g. salts).
2. Dispersing-washing:
   The substances on the fibres are not water-soluble. They have to be brought in a very fine distribution into the washing liquor. A combination of solid compounds (e.g. pigments) and water is called a suspension. A combination of liquid and water-insoluble substances (e.g. fats and oils) with water is called emulsion.
3. Reaction-washing:
   Substances that can be neither dissolved nor dispersed are rendered washable by means of a preliminary chemical or biological step (e.g. starch size).

WASHING OFF

The removal of softening agents, lubricant preparations, sizes, chemicals, textile auxiliaries, unfixed dyes and finishing agents. The washing-off process greatly influences water consumption, costs, waste water problems and fastness levels.

WATER GLASS

See sodium silicate.

WATER HARDNESS

Water hardness is the amount of calcium and magnesium ions (hard water salts) in water. These are capable of forming undesired bonds with textile auxiliaries and dyes. By 1°dH (1 degree of German hardness) is understood that 10 mg calcium oxide are present in 1 litre of water. This stoichiometry serves as the conversion base for other hard water salts. Hard water can be determined with the aid of colour indicators. Free aggressive carbon dioxide dissolved in water attacks many compounds where temperature and time play an important role. In most cases, bound carbon dioxide is prevalent in the form of hydrogen carbonates of calcium or of magnesium. On boiling/heating, the hydrogen carbonates decompose, forming insoluble carbonates (boiler scale), which precipitate and accumulate on machine parts. Sequestrates (e.g. EDTA) or polyphosphonates can be used to bind hard water salts in dye liquors. Polyphosphonates are not ecologically harmless. To determine the stability of surfactants to hard water according to DIN and ISO standards, water of adjusted calcium hardness must always be used. With the introduction of the international unit system, the magnitude "German degree of hardness" cannot be generally used, as there are also French, English and American degrees of hardness. Formerly, the calcium hardness of water was expressed as 10 mg CaO/1000 ml = 1 °dH (German hardness). The French degree, for example, is based on the molecule $CaCO_3$, which happens to have a molecular weight of 100. For this reason: 1 mmol/l = 10 °f (French hardness).

Levels of water hardness:

0 – 4 °dH	= very soft
4 – 8 °dH	= soft
8 – 12 °dH	= medium-hard
over 12 °dH	= hard

WATER LOCK

Device at the outlet of pre-treatment and dyeing steamers to ensure an air-free steam atmosphere. The outlet support often extends into the liquor of the first after-treatment bath.

WET FASTNESS

A collective term used mostly for general-use fastness to water, perspiration, washing and wet ironing of prints and dyeings which, with higher requirements, also include alkali, over-dyeing, sea water and wet light fastness properties.

W

WETTING AGENTS

Hydrophobic fibre surfaces and entrapped air prevent the rapid wetting of fibres/textiles with water when the textile goods enter aqueous treatment baths. Wetting agents as mediators between incompatible phases are chemically structured so that they contain hydrophobic and hydrophilic components in the same molecule. By having a uniform wetting effect on surfaces to be wetted out which are hydrophobic to water, i.e. by having their hydrophobic residue adsorbed there and turning their hydrophilic component to the aqueous phase, they reduce the surface tension of the fibre structure with respect to water: the textile material is wetted out and, at the same time, the entrapped air is released because the affinity of the water to the fibre surface is now greater than the affinity of the air to the interstice volume of the fibre structure.

WETTING POWER

Degree of capacity for wetting, based on the capillary activity of wetting agents.

X

XENON HIGH-PRESSURE LAMP
(Inert gas high-pressure discharge lamp, ultraviolet lamp); its spectral radiation density distribution largely corresponds to that of a cloudy sky with a high UV component. Used for Light fastness test ISO 105-B02.

YZ

YELLOW PAPER

Yellow-coloured indicator paper (stripes) that has been dyed with Yellow G used to check vats in vat dyeing. With a correct vat, the yellow clearly changes to cornflower blue in 3 s. However, if the colour turns yellow-olive or grey-blue (dirty), the vat has not been correctly composed, i.e. NaOH and/or hydrosulphite are/is lacking.