

TEXTIL

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REACTIVE DYES FOR PROCESSES WHICH SAVE WATER, ELECTROLYTES AND ENERGY

CHT Switzerland AG developed the BEZAKTIV GO range of reactive dyes for particularly economical dyeing processes: The high reactivity allows for an application at a lower temperature, while the excellent ease of removal of unfixed dyes allows for shorter washing processes.



Many industrial sectors all over the world show a clear trend to sustainability and a conscientious handling of resources. The textile industry is not exempted from this trend. Therefore, there have been numerous initiatives in the meantime which want consumers to appreciate purchased textiles to a greater extent. On the other hand, consumers demand a more sustainable textile manufacture without harmful chemicals and with an improved wastewater recycling, especially in Asian countries with a major textile industry. Consequently, many innovative textile companies optimise their manufacture processes and save resources: The use of biodegradable fibre materials (among others bamboo fibres, PLA or soy protein fibres) is e.g. examined. Some modern textile companies already test procedures for water-free PES dyeing and try to develop it furthermore.

The reactive dyeing of cellulose fibres and their blends is still being effected with water-based processes but in this field, too, a tendency towards cold pad batch processes or exhaust processes with short liquor ratios and lower temperatures of the dyeing and rinsing baths can be observed. The dye properties themselves are decisive for a successful use of reactive dyes in such processes: They must have a sufficiently high fixation speed, a very good ease of removal of hydrolysates and an excellent solubility. Moreover, reactive dyes are expected to reach high fastness levels and to lead to reproducible, levelled dyeing results without causing problems. Last but not least due to a good colour build-up they must also be efficiently applicable for dark shades.

Sustainable and economical dyeing with BEZAKTIV GO

Compared with a conventional reactive dyeing at 60 °C, the dyeing process with BEZAKTIV GO is generally shorter,



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which also increases the productivity for the textile finisher. Savings in the required salt quantity can be simultaneously achieved. Although the BEZAKTIV GO dyes are stronger and produce clearly more intense colours than conventional bi-functional reactive dyes, the table for the required salt quantity in the dyebath recommended by CHT is still valid (see brochure: «Application –process recommendations for BEZAKTIV dyes» / ready for download under www.cht.com/reactive-dyes or in the Bezema Colour Solutions dye app). The unnecessary salt and the resulting lower electrolyte concen-

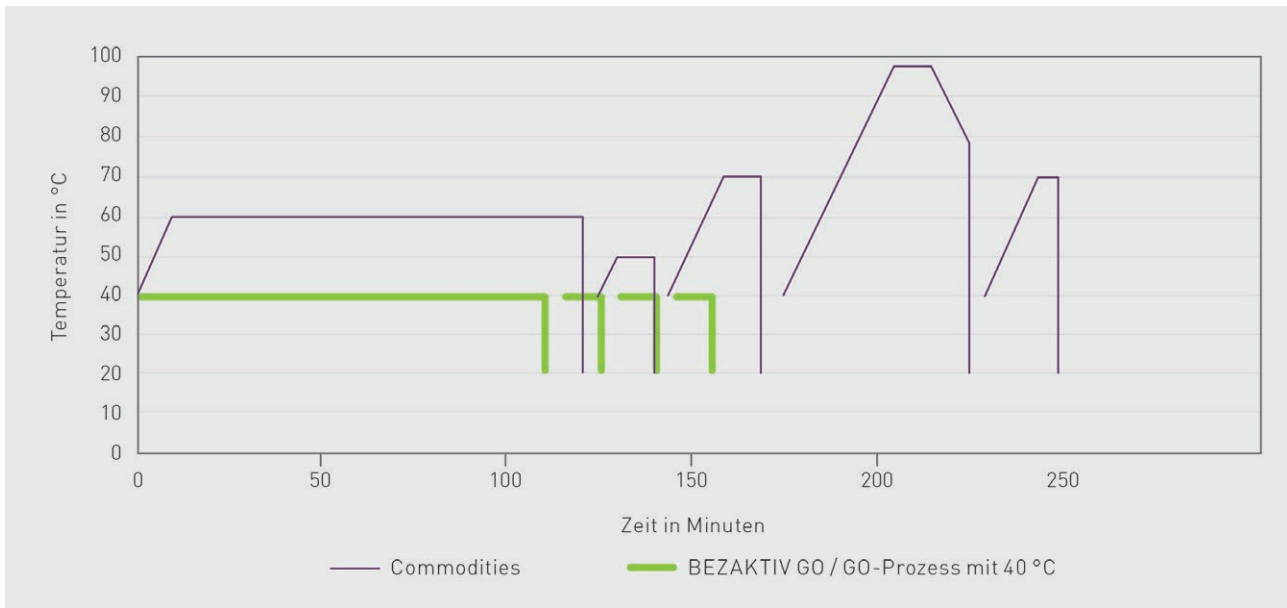


Fig. 1: The GO process stands out for lower temperatures and shorter process times.

tration in the dyebath not only allow for significant cost savings in the recipe but also for an improved washing off process of unfixed shares after the dyeing.

The dyeing of medium to dark shades where in classic procedures quite a big share of unfixed dye must be washed off reveals the benefits of the GO process in particular. With the combination of a very high fixation degree and an excellent ease of removal of hydrolysates, the BEZAKTIV GO range allows for a very efficient rinsing and soaping process. An additional positive effect is achieved by adding only low concentrations of the CHT auxiliary COTOBLANC SEL in the second soaping bath. As a result, excellent wet fastness levels

can be achieved on the textile using a washing process with a low water and energy consumption.

Even for dyeings in the cold pad batch process the rather high fixation speed allows for shorter dwelling times. The good wash-off-properties lead to savings in continuous washing processes even with dark shades or black.

p-chloroaniline-free dyeing with BEZAKTIV ZERO GO

As of now, the textile industry is offered new dye elements by the BEZAKTIV GO range under the name BEZAKTIV ZERO GO. ZERO refers to the content of undesired arylamines (as e.g. p-chloroaniline) which are not contained in these dyes.

Fig. 2: Comparison of the rinsing baths in the reactive dyeing process (top: commodities / bottom: process at 40 °C using BEZAKTIV GO and COTOBLANC SEL).



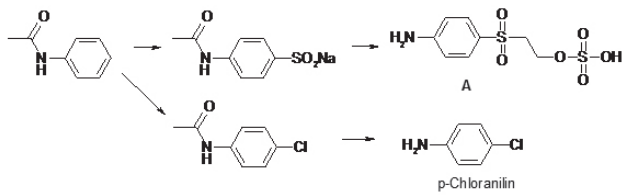


Fig. 3: One conventional component for vinyl sulphonic reactive dyes is the 4-amino-(2-sulphatoethyl) sulphone / A. During its synthesis p-chloroaniline may develop as by-product.

Conventional para-substituted sulphato ethyl sulphone which may possibly contain shares of the undesired p-chloroaniline was not used in these and other reactive dyes (see: fig. 3). The BEZAKTIV ZERO GO dyes can also be applied in the GO process which saves both energy and water. These dyes have good fastness levels (like e.g. the multiple washing fastness according to ISO 105-C09) and can no longer reductively detach p-chloroaniline.

The dyeing example shows that the BEZAKTIV ZERO GO dyes also lead to very deep colours and that they are especially well suited for dark shades.

The problem with reductively detachable p-chloroaniline of dyed cellulose mainly occurs with very dark shades and above all with black, for which most worldwide manufacturers use a black based on the Reactive Black 5. The BEZAKTIV ZERO Black GO does not contain any Reactive Black 5 and has therefore a very good multiple washing fastness according to ISO 105-C09 compared with a conventional reactive black. The three new additional elements BEZAKTIV ZERO Orange GO, BEZAKTIV ZERO Scarlet GO and BEZAKTIV ZERO Navy GO have also good multiple washing fastnesses and can be excellently used for shading the BEZAKTIV ZERO Black GO. The demanded fastness improvement in multiple washing is gaining in importance as it leads to an improved durability



0.1% BEZAKTIV ZERO Orange GO	2.8% CI Reactive Yellow 145
1.8% BEZAKTIV ZERO Scarlet GO	3.5% CI Reactive Red 195
0.1% BEZAKTIV ZERO Navy GO	0.2% CI Reactive Blue 221
2.0% reactive dyes	6.5% reactive dyes
40 g/l Glauber's salt	90 g/l Glauber's salt
5 g/l soda ash	5 g/l soda ash
2.5 ml/l NaOH 38 °Bé	3.5 ml/l NaOH 38 °Bé

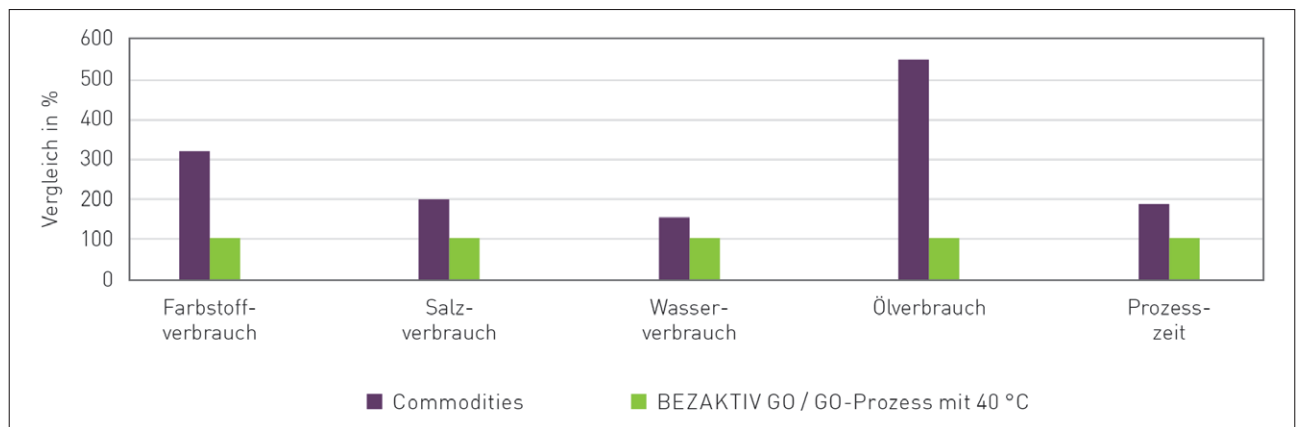
Fig. 4: Dyeing recipes for a dark red-brown adjusted with BEZAKTIV ZERO GO instead of bifunctional standard dyes. Both dyeing results are free from reductively detachable arylamines and have good multiple washing fastnesses and a comparable fastness level. The variant with BEZAKTIV ZERO GO, however, requires significantly lower dye and salt application amounts and additionally helps save energy and water.

of the textiles, which is a contribution to sustainability in textile manufacture. Moreover, the elements of the BEZAKTIV ZERO GO dyes have high fixation degrees, can also be applied in continuous processes and are free from AOX and heavy metals.

Textile finishers can easily see the actual savings that are facilitated by the BEZAKTIV GO dyes: The Bezema Colour Solutions dye app offered by CHT is a simple and smart calculation tool.

The comparison with the above shown recipes clearly shows that the dye application amount and the necessary electrolyte concentration are much lower when using BEZAKTIV GO dyes than when using conventional, bifunctional reactive dyes. Besides the calculation programme the CHT app additionally offers useful bits of information on the BEZAKTIV GO products - ranging from colour samples, all of the relevant fastness types and detailed product profiles up to useful recommendations for use.

Fig. 5: Comparison of the main cost factors when using conventional reactive dyes and BEZAKTIV GO.



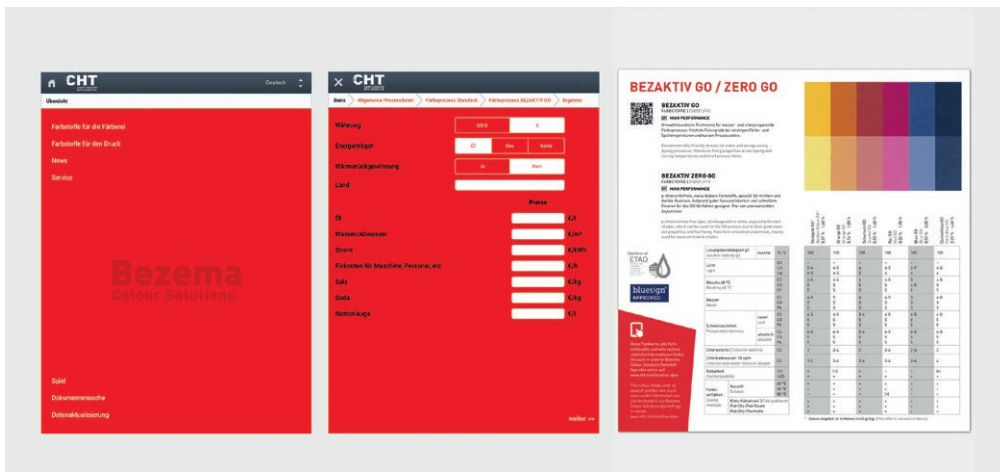


Fig. 6: The Bezema Colour Solutions dye app is available free of charge for mobile devices with iOS or Android in the App and Google Play Store. It offers many useful information bits on the BEZAKTIV GO dyes and the complete range of CHT Switzerland AG.

Since the CHT Group is focused on sustainable chemical products and process solutions, the BEZAKTIV GO products also meet highest standards: All of the currently sold elements are bluesign®-approved and suited to meet the requirements made by GOTS and Standard 100 by ÖKO-TEX. ■

Fig. 7: CHT Switzerland AG, the centre of excellence for dyes of the globally active CHT Group, develops, produces and sells the complete range of textile dyes as well as special textile chemicals.

