

Color & Whiteness

Volume 1, Issue 1
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Reviewing the concept of paper brightness

„Is the concept of standard brightness suitable today?“ was a question posed 1963 by van den Akken in Tappi Journal; this question produced much discussion and comments in later issues of the Tappi Journal. Paper brightness, defined as the integral of reflectance values multiplied with a Gaussian-like profile peaking at 460 nm, corresponds roughly to a method for the visual determination of the endpoint of pulp bleaching by looking at a sheet through a blue filter. The method is very useful for this purpose, but the concept of brightness evolved to become a synonym of „white aspect“ and later of „whiteness“. Most of the specification sheets for paper list brightness as the

number characterizing the white aspect.

However brightness is not a colorimetric number, in other words, it has no relation with the color appearance of the sample. With the growing number of bleaching processes

and pulps even the original use of brightness becomes limited because of the different evolution of reflectance values during the cooking process; this fact points out that comparison of brightness numbers for pulps of different origin is not

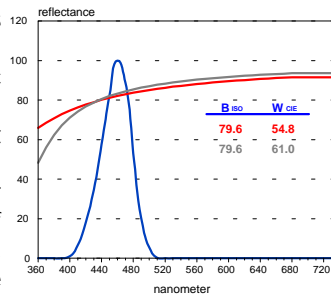
allowed. The example given in the figure is quite clear: two samples having the

same brightness numbers have different appearances as expressed by their whiteness.

The purpose of measuring brightness as a method to

assess appearance fails to provide reliable data.

The situation turns worse when looking to the extensive use of fluorescent whitening agents and shading dyes to increase perceived whiteness. (continues on page 2)



Brightness and whiteness of two paper samples

Introducing the newsletter

Color & Whiteness will be published tentatively on a bimonthly basis and it will contain themes of actual interest as well as serve as a means to disseminate information from the color area. It will contain at least two digest articles on

technical issues, discussed in length in reports available for downloading at the Website of Axiphos, a list of forthcoming events and reports of past events where Axiphos has actively participated.

There will be a column on

activities concerning Polaris—White Star software and the last page will contain description and discussion on an actual and useful Website found while surfing the Internet.

The editor

Inside this issue:

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Special points of interest:

- What does brightness really mean? Do we need it today? Read the story.
- How do you calculate color differences? Read about last developments
- Pre-launch announcement of Polaris Software
- All you always wanted to know about Whiteness (see last page)

On color Differences

While perceiving small color differences demands good color vision and extensive training, there are many cases where no agreement between colorists can be reached. This is specially sensitive in those cases like setting product specifications or rejecting claims. One of the aims of color science is the exact quantification of color differences to express them as numbers; however color perception belongs to the area of „Psychophysics“ that studies the relationship between physical measurement of stimuli and the sensations and perceptions that those evoke.

In spite of much study and experimentation it has not been possible to find a formula by which small color differences can be expressed as numbers everybody agrees upon; the concepts and goals are quite clear though, they were

stated after the work of MacAdams. The introduction of CIELAB color space had as a goal the quantification of small color differences, but despite the efforts it is not totally uniform and reproduces only about 80% of the validation samples. The CIE94 formula attempts to correct the non-uniformity introducing ellipsoids that change size and shape according to its position in color space, an idea introduced with the CMC pass/fail formula. Much of the success of the CMC formula lies on the fact that the CMC equation builds a tolerance system, it is not a color space. Further work has been done on the orientation of the ellipsoids that has resulted in two new equations: DIN99

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and CIELAB2000. The DIN99 introduces new corrections to CIELAB aiming at an equation with Euclidean distance. CIELAB2000 introduces new corrections to the CIE94 formula, which take into account deviation in the orientation of ellipsoids in the blue region through the introduction of a correction term.

DIN99 has been published as DIN norm, while CIELAB2000 will be published in the October issue of „

Color Research and Applications“. Both formulas must now prove their usefulness in the practical work of industrial applications.

For more details download the report „On color differences formulae“.

Reviewing the Concept of Paper brightness (continued from front-page)

Fluorescence depends on the UV content of the light source and leads to brightness values well over the „ideal“ value of 100; shading dyes on the other hand have no influence on brightness, but a huge impact on perceived whiteness.

„brightness is not connected to the appearance of the paper and as such it has become obsolete for modern paper manufacturing“

Attempts to recover the original brightness now buried in fluorescence depend on the method of eliminating fluorescence. At the end one must remember that brightness is not connected to the appearance of the paper and as such it

has become obsolete for modern paper manufacturing and its use should be dropped in favor of more informative parameters like whiteness and metameric indexes that permit setting up structures and algorithms for effective whiteness control.

For more details download the report „Reviewing the concept of paper brightness“.

Looking ahead

Fluorescence 2001 September 16-19, 2001, Amsterdam, Netherlands

40th International Man-Made Fibres Congress September 19-21, 2001 Dornbirn, Austria

EXPO Paper Russia September 25-27, 2001, St.Petersburg, Russia

PAPEX October 2-4, 2001, Manchester, UK

Plastics USA 2001 October 2-4, 2001, Chicago IL, USA

IP October 9-11, 2001, Grenoble, France

ITMA-Asia October 15-19, 2001, Singapore

DfwG Meeting (German Color Association) October 19, 2001, Hagen, Germany

Textiles 2001 October 21-24, 2001, Greenville SC, USA

ABTC 34th Congress of Cellulose and Paper October 22-25, Sao Paulo, Brazil

K-2001 October 26-November 2, 2001, Duesseldorf, Germany

IS&T/SID 8th Color Imaging Congerence November 5-9, 2001, Scottsdale AZ, USA

APPITA November 9, 2001, Rotorua, New Zealand

ISCC Williansburg Conference February 23-25, 2002, Williansburg, USA

Looking back

Detergency on Textiles: Course 2001 February 11-16, 2001, Quito, Ecuador

The first course of this series was given six years ago and it has become a classic for people working in the detergents area in the Latin American region. During the lectures delivered by the instructors Mr. Rodrigo Olmedo (Detertec, Ecuador), Dr. Duncan Philips (UMIST, UK) and Dr. Claudio Puebla (Axiphos, Germany) different aspects and topics from fabric finishing, influence of different dyes and fluorescent whitening agents, to effects of washing conditions and habits, influence of light exposition and psychological perception of



Detergency on Textiles
View of the class

benefits were presented, reviewed and illustrated with examples. Furthermore socio-economical factors were reviewed and discussed in detail, as well as new developments on the application of detergents. The class was attended by numerous participants from leading local and global companies dealing with the detergent area (for details visit <http://www.detertec.com>).

Innovation in Measuring Color and Whiteness May 9, 2001, Greiz, Germany

This one-day conference gave an

update on modern methods to approach the assessment of color and especially whiteness. After a general overview and presentation of modern methods for assessing whiteness by Dr. Claudio Puebla, Axiphos, Germany, practical examples were given by Mr. Wehner, Thorey, Germany followed by methods for setting fluorescent standards with a two-monochromator instrument by Dr. Wolfgang Böhme, Labsphere, Germany. Dr. Klaus Witt, BAM, Germany gave an overview and background for the application of a newly developed equation for color differences, followed by presentations of new instruments by Mr. Schweim, Minolta, Germany and Mr. Geipel, Datacolor, Germany (for details contact Mrs. Brigitte Mensak. mail@titv-greiz.de).

Polaris: pre-launch announcement

Polaris is a new software dedicated exclusively to whiteness and its assessment. Current software for whiteness operates with the filter regulating the UV content of the light coming onto the sample, in an attempt to illuminate the sample with a light similar to daylight D_{65} . In the practice however, this goal is hardly achieved and it is a recognized fact, that



traditional instruments do not give correct numbers for whiteness. Polaris is the software accompanying the new line of modified instruments of 3600 series of Minolta and takes fully advantage of the numerical UV control. Main feature is the separation of absorption and fluorescence parts of the reflectance

spectrum; this allows the correct calculation of color coordinates, since the software delivers an undistorted profile of the fluorescence. Different plug-ins are planned as implementation of process control software for direct control of dosage pumps. Definitive launch is planned for the end of September (more details at <http://www.axiphos.com>).

...it is a recognized fact that traditional instruments do not give correct numbers for whiteness."

INSIDE AXIPHOS

Axiphos GmbH, Loerrach, Germany was formed February 2001 with the aim to provide marketing and technical services on the area of color, especially on the area of whiteness, through extensive use of the Internet and

electronic communication. Contrary to traditional consulting companies, Axiphos aims to provide complete solutions that assure production and quality stability as well as acceptance of final products by

customers. This includes also a permanent support of customers through continuous monitoring using Internet techniques. Technical expertise and software development are central issues and prerequisite towards these goals, In this respect Axiphos is in a continuous process of innovation and development under the slogan „do business and have fun“.

...Axiphos aims to provide complete solutions that assure production and quality stability..."

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Axiphos GmbH was founded in February 2001 by Dr. Claudio Puebla as a company aiming to provide Internet oriented services of Marketing, Trading and Consulting for the areas of Color and Whiteness for the business segments Paper, Detergents, Textiles, Plastics, Printing, Paints and Coatings. Axiphos is applying modern technologies to develop materials, tools and software to allow control, assessment and recipe formulation on those areas where fluorescence plays an essential role, specially the area of Fluorescent Whitening Agents.

Focus on

WHITENESS

The site at <http://members.tripod.de/whiteness> is dedicated exclusively to the subject „Whiteness“ in all areas of applications; the site provides not only theoretical background and information but also has extensive libraries with related literature and norms. A contact form is also provided to clarify specific questions and stimulate discussion.

Forthcoming themes:

- Vol. 1 Issue 2 (November): Reviewing the concept of whiteness / On whiteness formulas
Issue 3 (January): On Whiteness scales calibration / On numerical UV control
Issue 4 (March): Controlling pulp bleaching / On whiteness matching
- Vol. 2 Issue 1 (May): Determining light-fastness of FWA / Calibrating assessment booths for whiteness
Issue 2 (July): About photobleaching agents / On fluorescent pigments
Issue 3 (September): Influence of opacity on whiteness / On fluorescence

On the web



Finding your way through the Web may be (most of the times) quite rewarding but also (sometimes) very frustrating. Search engines are the most helpful tools to increase your effectivity while digging for information. In this respect **Chemindustry.com** (<http://www.chemindustry.com>) has been conceived exclusively for the chemical industry, it works on a categorized structure that allows the user to search for information based on specific areas. Categories may be Chemical Manufacturers, Resources, Equipment & Software, Industry Services, Career & People, Organizations, Academic Institutions,

and Events. Every category is subdivided in different areas, for example „Chemical Manufacturers“ can be searched on Adhesives, Agrochemicals, Dyes & Pigments, Petrochemicals, etc. or the topic „Resources“ contains Portals, Patents, Databases, etc. Information can be found by just typing a keyword and asking the system to search the entire database, the search can be narrowed by filtering the information defining the type of information (business information, event, industry service, etc), geographical area (country) and category. If no keyword is desired, the database can be searched going through the different categories.

There are two other sections : „e-deals“ and „chemical names“. „E-deals“ is a portal for e-commerce on chemicals, equipment, software, and others, where specific items are offered for

sale. The category „Others“ include jobs, services, courses, etc. „Chemical names“ offers the possibility to find information to a compound by giving its chemical name, CAS number or molecular formula (a wild-card option is also available).

For the area of Color mainly the category „Dyes & Pigments“ is of interest followed by categories like „Detergents“, „Plastics“ and „Coatings“. Under „Dyes & Pigments“ nine sub-categories are listed to organize further the information for search. Everything related with this topic can be found from intermediates for synthesis to color matching services. FWAs are searchable under the keyword „Fluorescent Whitening Agents“.

Chemindustry.com is the one-stop place to visit when looking for chemical information.