



Application Information K-A 1

# Additives for Paper Coatings and Converting

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## Introduction

Paper Coating and Converting impart special qualities to the paper surface to deliver a performance not exhibited by the uncoated base paper. In all cases additives and functional reagents are required to deliver an optimised paper surface and the required performance.

BYK Additives and Instruments has products that can assist in the preparation of the coating colour, improve the coating process, enhance the paper surface and deliver specialised functional performance.



## Wetting and Dispersing Additives

Effective dispersion of the coating materials is important in ensuring the best effects and performance are achieved and in developing the optimal paper surface. Incomplete dispersion leads to sub-optimal performance, coating defects and potential damage to the coating equipment itself. Wetting and Dispersing Additives can be used to assist this process, avoiding lengthy, high energy dispersion processes.

The **BYK and DISPERBYK** products offer a range of potential additives that can be matched to the materials to be dispersed to deliver the optimised coating colour in a cost effective manner.

### A Coating Defect Caused by Poor Dispersion



Blade streak

figure 1

## Defoaming and Anti-foam Additives

The presence of entrained air in the coating colour will lead to an uneven coated surface, and potentially one with gaps in the coating. Defoaming or Anti-foam Additives may be used to prevent the production of foam or to destroy it

once formed by post addition. The BYK defoaming additives provide a wide selection that can be matched to the coating materials to give the required level of compatibility to deliver excellent foam prevention or elimination without

creating other surface defects. The range includes:

- APEO-free Mineral Oil Defoamers
- Silicone Defoamers
- Polymeric Defoamers, that are both mineral-oil- and silicone-free

## Rheology Modifiers

During the coating process the coating colour will be subjected to a wide range of shear conditions. Throughout these the colour must remain stable and withstand these changes in order to develop a continuous, even and optimised coating whilst maintaining excellent coating machine runnability.

The **BYK and OPTIFLO** range of Rheological Additives can prevent coating colour sedimentation and control shear rheology throughout the process to deliver an optimised coating of excellent performance.

### Rheology Control

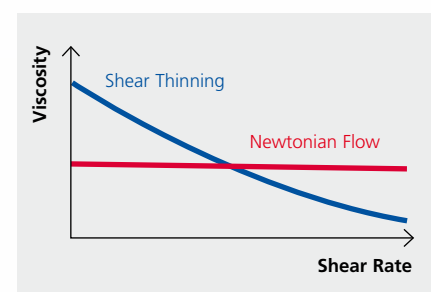


figure 2

## Surface Active Additives

Surface Active Additives can be used to control surface tension both of the coating colour during coating and of the finished coated paper.

In **Curtain Coating** control of the surface tension of the coating colour during the “drop of the curtain” is essential to prevent splitting and retain a stable curtain. Through understanding the interfacial chemistry **BYK Surface Tension Control Additives** can be matched to the coating operation and used in combination with **BYK and OPTIFLO Rheological Additives** to deliver the optimised coating solution. Silicone-free product options are available.

In **Cast Coating** surface additives can be used to improve the release from the coating rollers to give both a better quality coating and an increase in time between roller clean downs.

The performance of a coated paper surface can be enhanced by the use of Surface Active Additives:

- The evenness of a coating is related to the wetting of the paper surface and the penetration speed into the paper web. Reduction of surface tension with BYK surface active additives products will improve the speed, distribution and penetration into the paper web and so deliver a more uniform coating surface.
- Printability is related to printing ink acceptance and adhesion and is in turn a function of the wettability and uniformity of the paper surface. The correct balance of polar to disperse components of the surface tension is critical to delivering good printability. Failure to achieve these may lead to print mottle, missing dots and dot gain.

### Surface Tension and Rheology Control – Curtain Coating – Curtain Stability



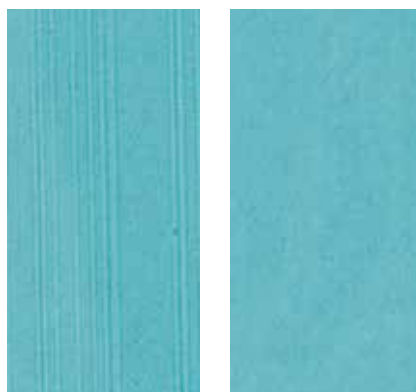
Standard coating color



Standard coating color  
+ BYK-3410 (0.8 parts)

figure 3

### Levelling with BYK-DYNWET 800 N

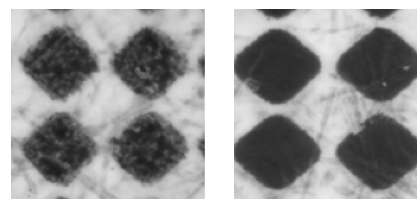


Control

0.4 %  
BYK-DYNWET 800 N

figure 4

### Improving Printability



Control

+ Surface Active  
Additive

figure 5

## Wax Emulsions

Wax additives can also be considered to be Surface Active Additives. The Incorporation of wax into a paper coating can improve the properties of the paper coating and impart functional performance to the paper. The **AQUACER** and **HORDAMER** ranges of wax emulsions provide a highly effective means of introducing these products. The ranges include Natural, Synthetic and Semi-Synthetic waxes which combine with emulsification technology to deliver products suitable for wide range performance enhancements and functional surface developments.

### Gloss Streaks on Matt Paper

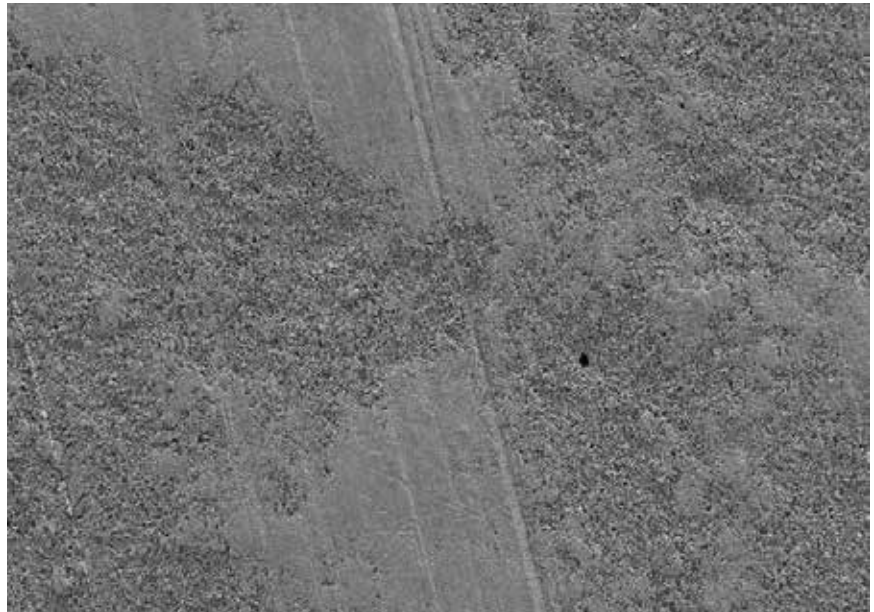


figure 6

These include:

- Improvements on **Rub and Scratch Resistance** leading to papers that are both less prone to rub marks in the coating machine and scratch marks in use.
- Reduction of **Penetration** of coating materials into the paper web leading to improved effectiveness of the coating.
- Improvements in **Printability** by creating a more uniform surface thus reducing any tendency to mottling.
- Adjustment in the **Friction** between coated paper sheets can be achieved, to both increase and reduce slip.
- A wax coating allows **Heat-sealing of paper to polymer films** to provide an efficient and effective means of producing hermetically sealed packages – for example medical packages.
- **Thermal transfer of printed images** from paper to other substrates is facilitated by a coating with wax additives, carefully selected to match the melting point of the wax with the temperature of the transfer process.
- **Barrier Papers** for oil, water, grease and fat can be produced.

# Activated Clay Coatings

Modified clay products can be used to deliver specialised functional surfaces for special printing applications. The **FULACOLOR** range of acid activated clays products combine controlled porosity with reactive surfaces to give products suitable for a number of printing duties:

- For **Carbonless Copying Paper** the acid activation process develops a surface that has both excellent absorption properties and reactive sites to deliver an immediate, sharp and permanent image with all colour former systems and microcapsule types.
- For **Inkjet Printing** the excellent absorption properties can be employed to deliver a bright, clear and sharp image with all ink technologies in a highly cost effective manner. Controlled particle size distribution allows rapid removal of the ink carrier to deliver fast drying, which is of critical importance in high speed printing applications.

## Carbonless Copy Paper

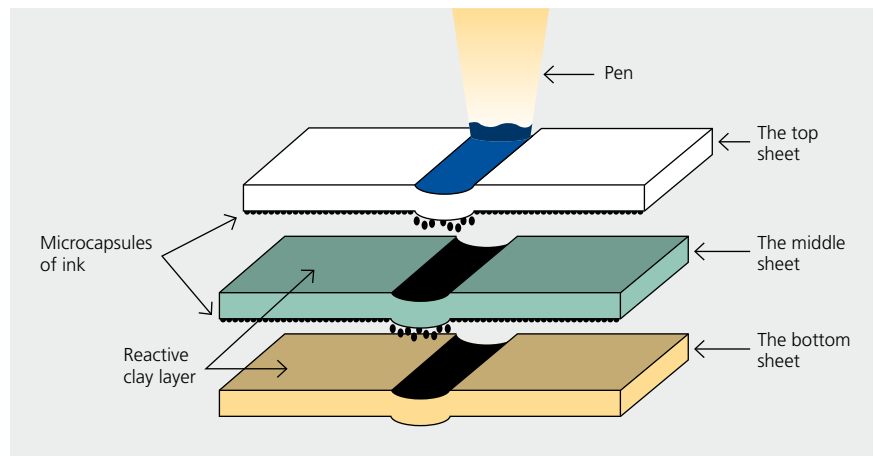


figure 7

## Inkjet Prints with and without FULACOLOR

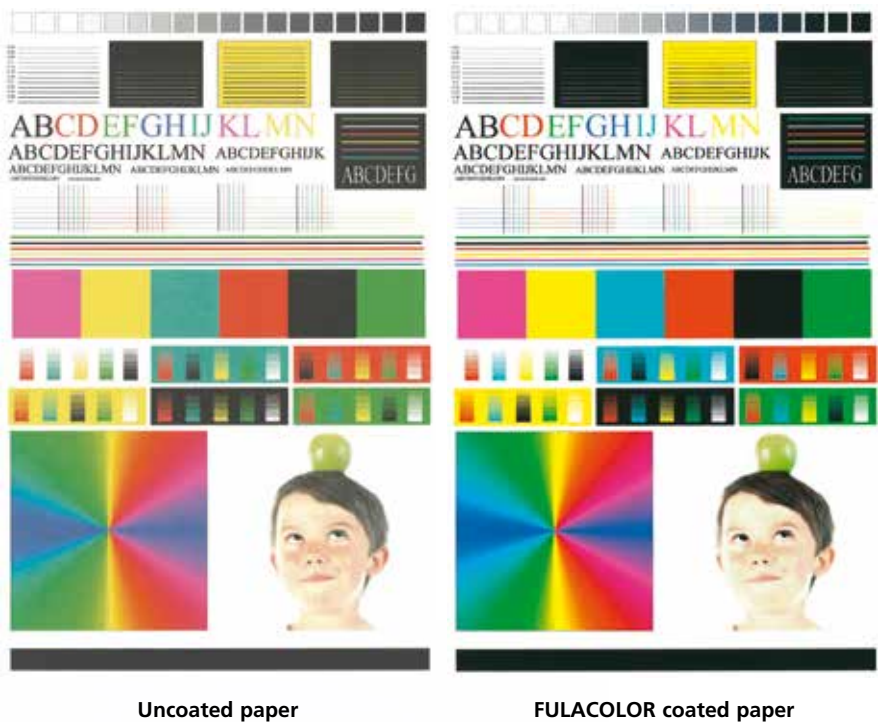


figure 8

## Synthetic Layered Silicate Colloids

The unique **LAPONITE** synthetic layered silicate colloids disperse completely in water under moderate shear to individual platelets to give a clear dispersion. When the shear is removed the platelets quickly reassemble to form a "house of cards" structure which can stabilise dispersions and prevent sedimentation.

When shear is reapplied the structure is immediately destroyed and reverts to liquid form. Coated onto paper the Laponite platelets align to form a transparent film. The films can be utilised in a number of duties:

- The aligned nature of the Laponite platelets are ideal for creating a **Barrier** to larger molecules by creating a "tortuous path" in either direction.
- **Anti-static Base Papers** can be achieved. The very small particle size of the dispersed colloid and the charge distribution of each particle combine to produce a conductive layer that can dissipate and prevent static charge build up, particularly important in application where a static spark could create problems e.g. abrasive papers.
- The same basic technology can be employed to develop **Conductive Coatings**.

### Single LAPONITE Platelet

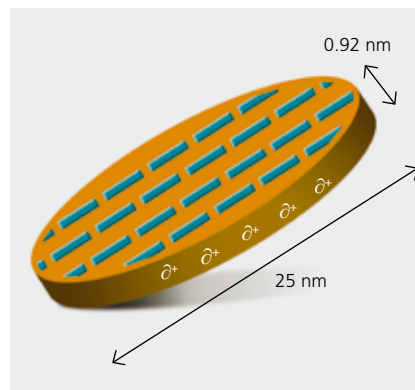


figure 9

### Gel Formation: House of Cards



figure 10

### Barrier Properties

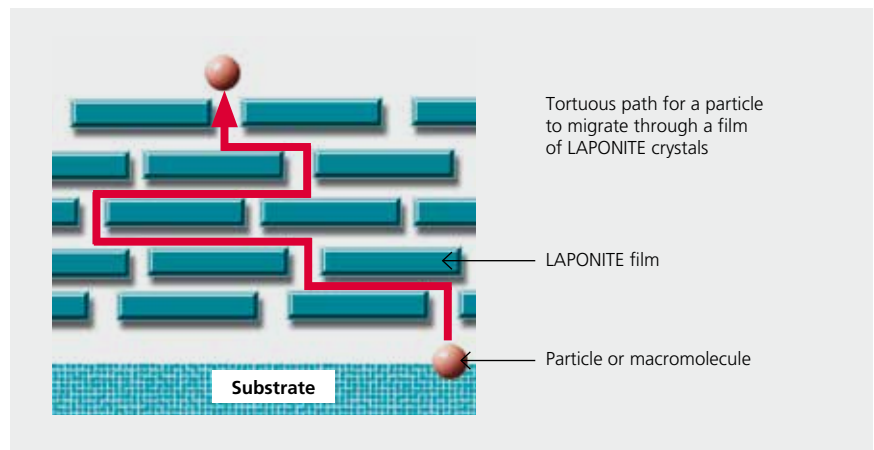


figure 11

## Optimised Solutions

The range technologies available facilitate the development of optimised solutions for specialised paper applications. This is supported by state of the art analytical capability which allows characterisation of the paper

surface. This understanding of the surface combined with a knowledge of the requirements of the application permits the identification of the ideal additive and functional coating material formulation. The range of products

available ensures that specific requirements, such as food contact authorisation, can be considered and satisfied in developing the optimal solution.

For more information about our additives and instruments, as well as our additive sample orders please visit:

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Additive Guide



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This issue replaces all previous versions – Printed in Germany