BYK
Additives & Instruments

Substance for Success.

Technical Information TP-TI 1

Wetting and Dispersing Additive BYKOPLAST-1000

Liquid Colors for Thermoplastics

A member of ALTANA

Why Wetting and Dispersing Additives for Liquid Color Concentrates?

The use of liquid colors for the coloration of thermoplastics has regained interest since the development of easy-to-use metering systems. Thus, quick and convenient color changeovers are feasible.

Key application areas for liquid colors are in transparent shades of water bottles or in small parts such as caps and closures etc.

figure 1

Why wetting and dispersing additives?

For the high throughput processes broadly employed in these application areas, a liquid color has to fulfill the following requirements:

- controlled viscosity for ease of pumping.
- high pigment loading to avoid screw slippage induced by certain carrier systems.
- high pigment loading for favorable economics of storage and production.

A good dispersion of the pigments is necessary in order to reach these requirements. Various organic pigments in non-polar carrier systems are notoriously susceptible to dispersion difficulties.

Wetting and dispersing additives solve these problems by enabling the preparation of highly concentrated, easy flowing color concentrates.

How do Wetting and Dispersing Additives Perform?

During the dispersion process pigment particles are reduced in size; ideally to primary particles.
Agglomerates, pigment "groupings" that are in contact along their edges and corners, exhibit only small interactive forces between each other. The interfaces are efficiently wetted by wetting additives. The agglomerates are broken down into smaller particles by the shear forces exerted by traditional dispersion equipment. The system endeavors to escape this energy-rich state in order to revert to its previous low energy condition.

The deflocculated state achieved by the shear energy of the dispersion equipment can be stabilized by an appropriate additive (figure 2).

The dispersion process

The different steps of the pigment dispersion process can be divided into three steps

During **step 1**, all of the air and moisture at the pigment surface is replaced by the carrier system.

Step 2 represents the true grinding stage. Through mechanical energy (shear forces) the pigment agglomerates are broken up and accordingly reduced in size.

In the concluding **step 3**, the pigment dispersion must be stabilized in order to prevent the formation of uncontrolled flocculates.

Steps 1 (wetting) and **3** (stabilization) can be influenced by additives.

Wetting additives accelerate the wetting of pigment agglomerates by the carrier: dispersing additives improve the stabilization of the pigment dispersion. One and the same product can often function as both the wetting and dispersing additive.

Pigment Dispersing

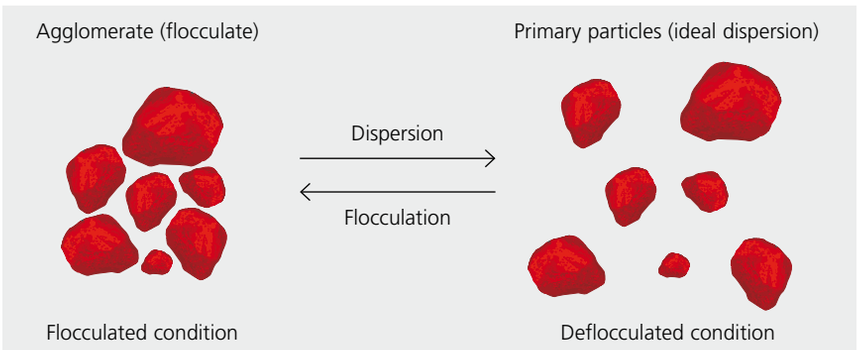


figure 2

The Wetting and Dispersing Process

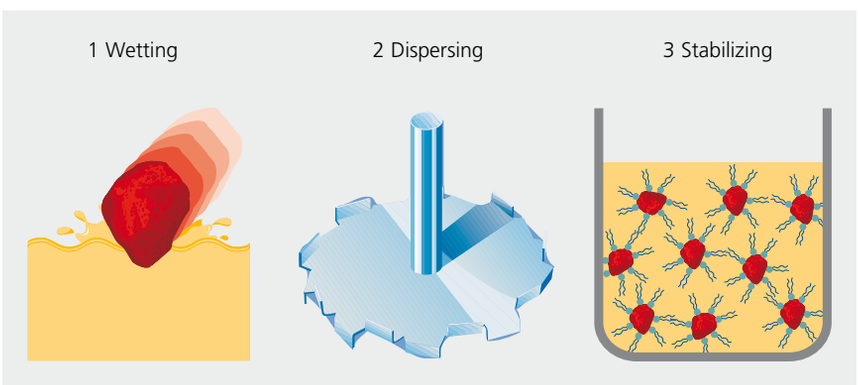


figure 3

BYKOPLAST-1000 Benefits: Increasing Pigment Loading at Constant Viscosity

Carrier: paraffin oil, e.g. Esso Bayol 82. Viscosity curves were measured using a controlled stress rheometer (Reologica Stresstech) at 23 °C.

Measurements were made 24-48hrs after grinding.
BYKOPLAST-1000 allows higher pigment loading which can lead to lower production costs.

Formulations

Pigment	Additive levels: % on pigment
Pigment Blue 15:3	25
Pigment Yellow 62	10
Pigment Red 53:1	25

figure 4

Pigment Loading (%)

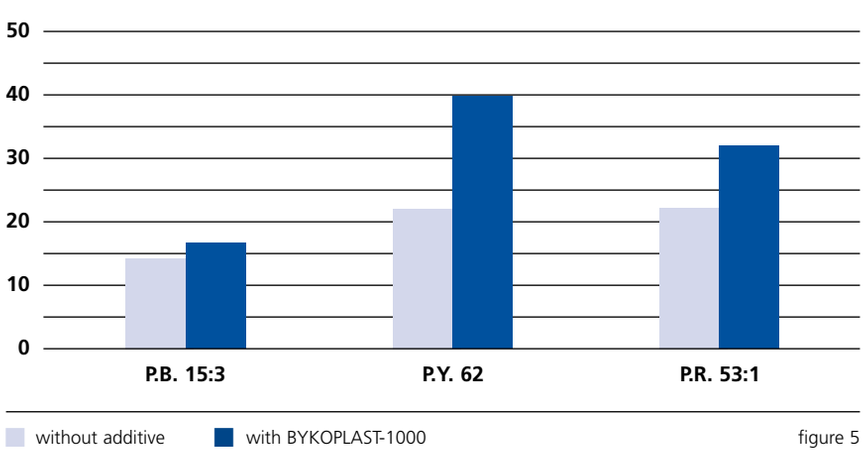


figure 5

Pigment Blue 15:3 e.g. Heliogen Blue K6902

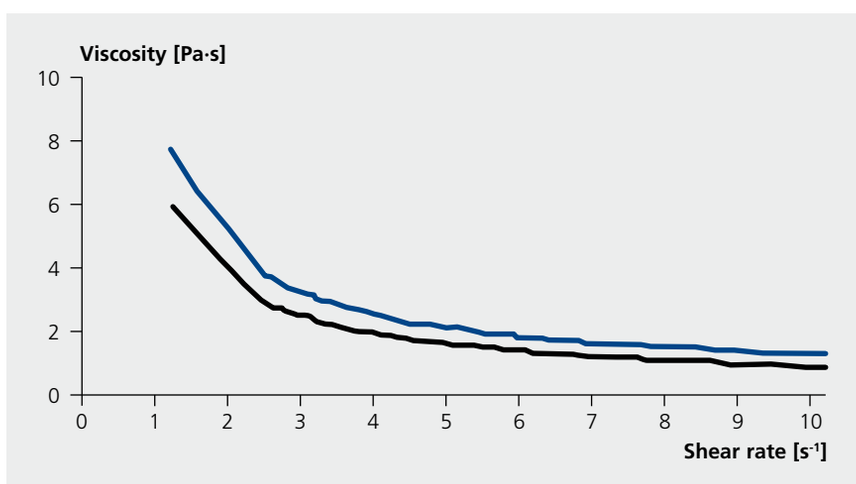
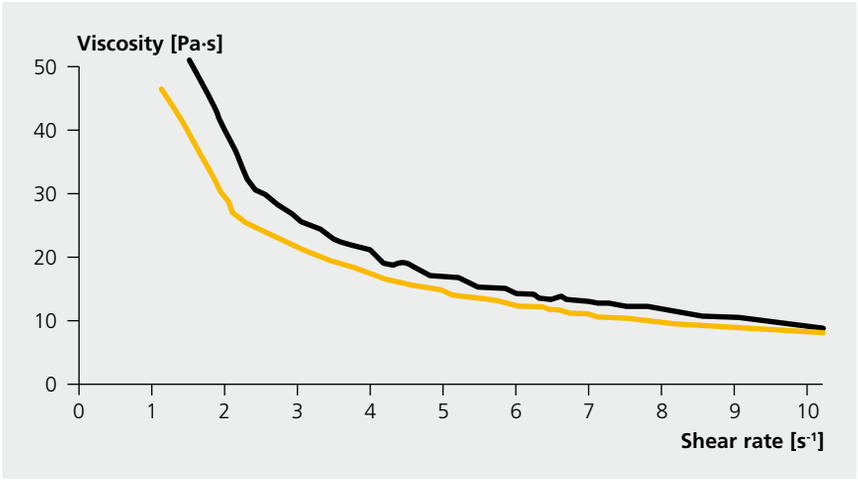


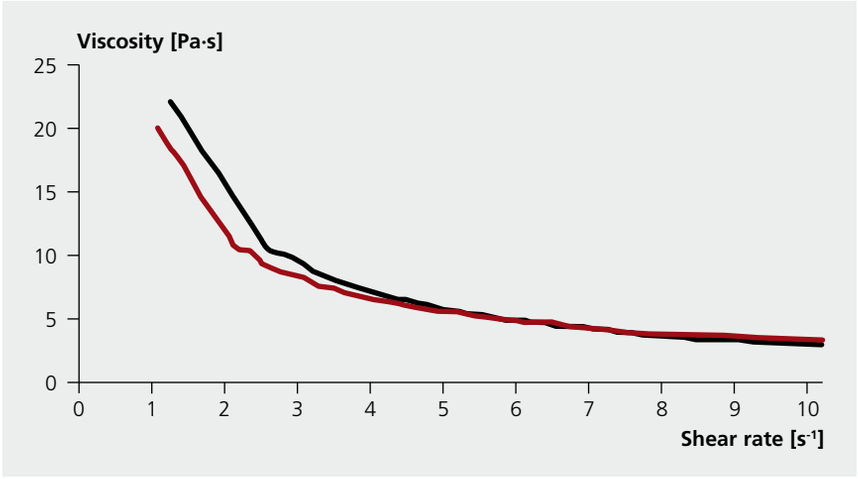
figure 6

Pigment Yellow 62 e.g. IRGALITE Yellow WSR



without additive with BYKOPLAST-1000 figure 7

Pigment Red 53:1 e.g. IRGALITE Red LCB



without additive with BYKOPLAST-1000 figure 8

BYKOPLAST-1000 Benefits: Decreased Viscosity at Fixed Pigment Loading

Carrier: paraffin oil, e.g. Esso Bayol 82.
Viscosity curves were measured using a controlled stress rheometer (Reologica Stresstech) at 23 °C.
Measurements were made 24-48hrs after grinding.

BYKOPLAST-1000 offers solutions for color concentrates based on pigments that are difficult to disperse.

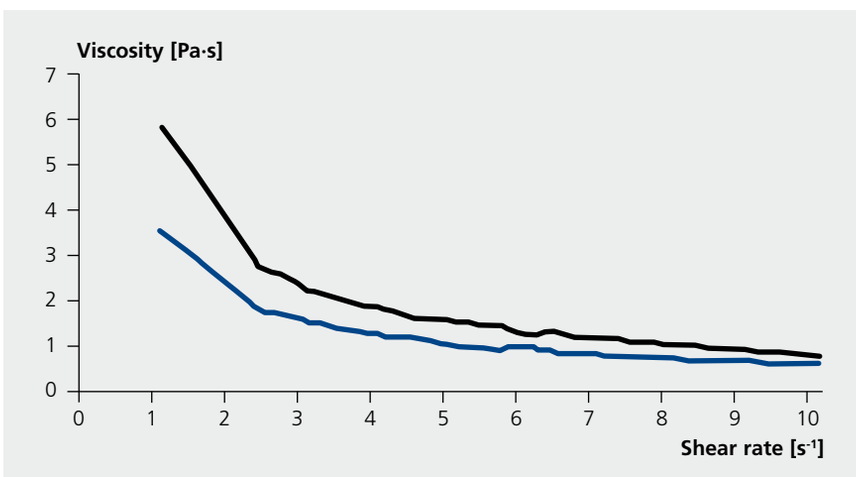
Depending on the pigment used, a dose of BYKOPLAST-1000 (approx. 10-25%) significantly improves the viscosity profile of the pastes.

Formulations

Pigment	BYKOPLAST-1000: % on pigment
Pigment Blue 15:3, 17.5%	25
Pigment Yellow 62, 25%	10
Pigment Red 53:1, 25%	25

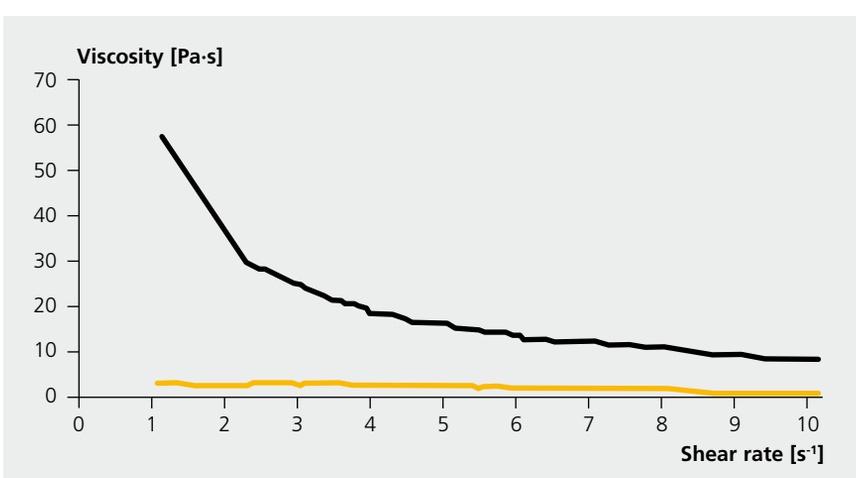
figure 9

Pigment Blue 15:3 e.g. Heliogen Blue K6902



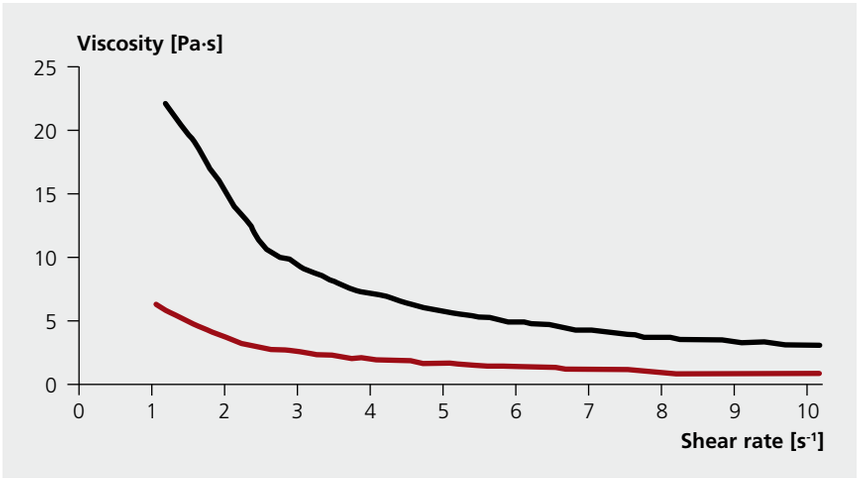
without additive with BYKOPLAST-1000 figure 10

Pigment Yellow 62 e.g. IRGALITE Yellow WSR



without additive with BYKOPLAST-1000 figure 11

Pigment Red 53:1 e.g. IRGALITE Red LCB



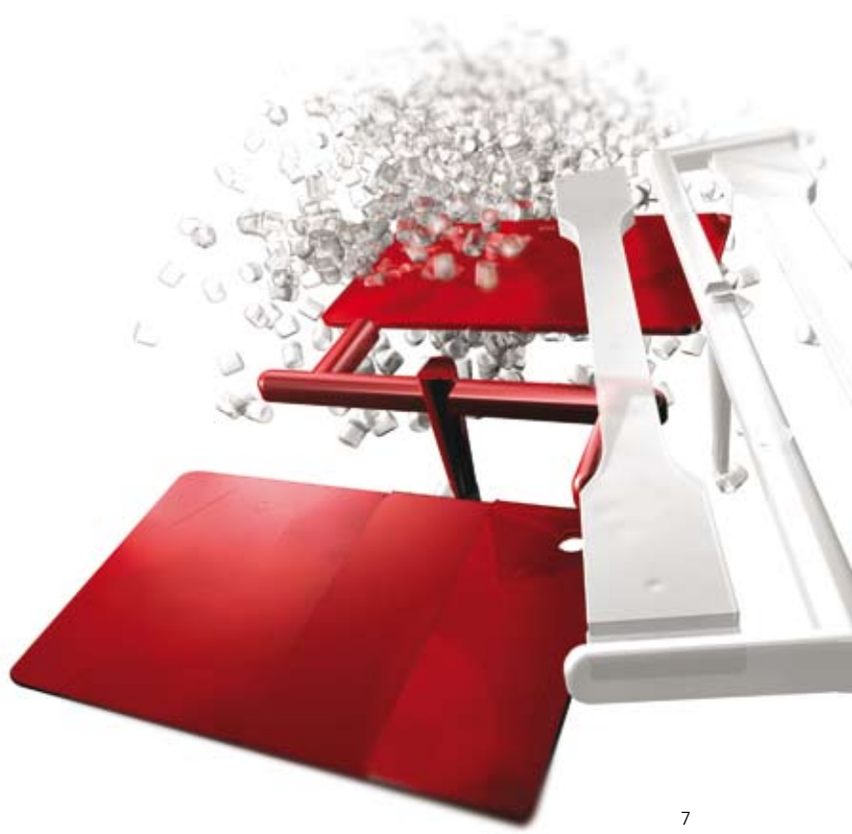
■ without additive ■ with BYKOPLAST-1000 figure 12

Additional Information

Applications:
BYKOPLAST-1000 is a general purpose additive for organic pigment dispersions, such as Lake Red, azo salts like P.Y. 62 and phthalocyanine blue pigments. In addition, good results have been obtained with certain grades of DPP pigments.

BYKOPLAST-1000 is designed for compatibility with polyolefins, polystyrenes and modified polystyrene systems.

Regulatory information:
At the time of publication the product fully meets all requirements of the European Union for "articles and materials intended to come in contact with foodstuffs" acc. to Dir. 2002/72/EC (incl. drinking water) and acc. 21 CFR (FDA) §175.105 and §175.300.
For the current legal status please contact our product safety department.



Products and Applications

BYK Additives

Additives are used during the production of coatings, printing inks and plastics to optimize the production process and to improve the quality of the final product.

Product Range Additives
- Additives to improve surface slip, leveling and substrate wetting
- Adhesion promoters
- Defoamers and air release agents
- Foam stabilizers
- Processing additives
- Rheological additives
- UV-absorbers
- Viscosity depressants
- Waxes
- Wetting and dispersing additives for pigments and extenders

Application Areas
- Ambient curing resins (FRP)
- Architectural coatings
- Automotive OEM
- Automotive refinishes
- Can coatings
- Coil coatings
- Color masterbatches
- Industrial coatings
- Leather coatings
- Marine paints
- Molding compounds
- Paper coatings
- Pigment concentrates
- Polyurethane foams
- Powder coatings
- Printing inks
- Protective coatings
- PVC plastisols
- Thermoplastics
- Wood and furniture coatings

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