APPLICATION INFORMATION

WETTING AND DISPERSING ADDITIVE BYK-MAX D 4220

TP-A 10

A member of ALTANA

Contents

Why use 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.

Why use 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.

Good pigment dispersion is needed to meet 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.

Note

To ensure the best appearance and full functionality, please open in Adobe Acrobat.

How do wetting and dispersing additives perform?

During the dispersion process pigment agglomerates are reduced in size; ideally to primary particles. Agglomerates are pigment particles that are attached to each other via edges and corners. They exhibit only small interactive forces between each particle. The interfaces are efficiently wetted by wetting agents. 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 as a result of the shear forces exerted by the dispersion equipment can be stabilized by an appropriate additive (G. 01).

The dispersion process

The different steps of the pigment dispersion process can be divided into three steps (G. 02).

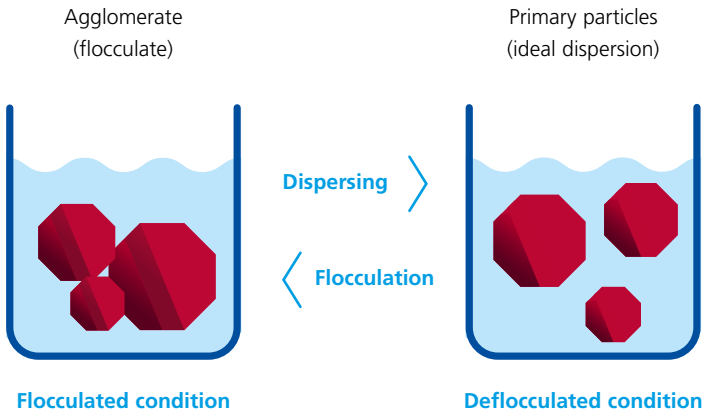
During **step 1,** all of the air and moisture at the pigment surface is replaced by the carrier system.

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.

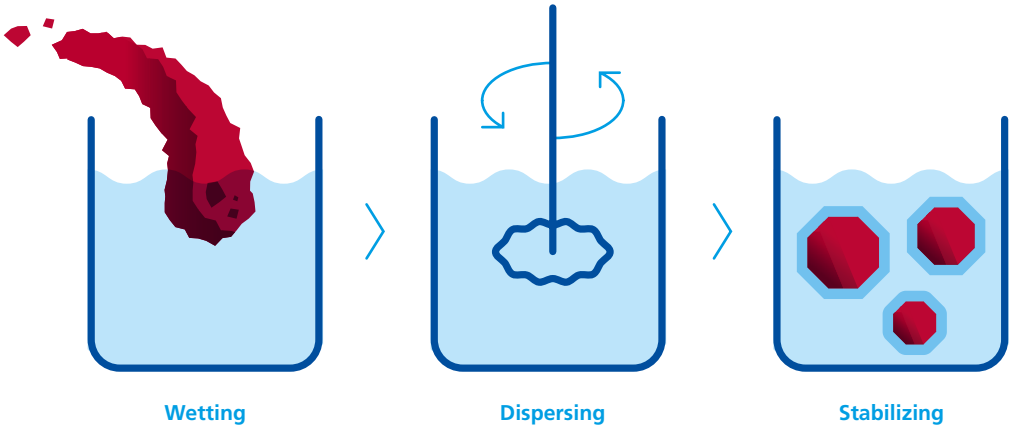
Steps 1 (wetting) and **3** (stabilization) can be influenced by additives. Wetting agents accelerate the wetting of pigment agglomerates by the carrier; dispersing agents improve the stabilization of the pigment dispersion. Wetting and dispersing additives unite both mechanisms of action in one product, i.e. they are both wetting and stabilizing.

Pigment dispersing



G. 01

The wetting and dispersing process



G. 02

Benefits of BYK-MAX D 4220

BYK-MAX D 4220 has a broad compatibility in different pigment and carrier systems. Incorporating the additive into liquid color concentrates can result in two benefits, either a higher pigment loading or a lower viscosity of the color concentrate. This is illustrated by the following results in liquid color concentrates based on a paraffin oil carrier and the pigments in T.01. Viscosity curves were measured 24–48 hours after grinding at 23 °C using a controlled stress rheometer.

Formulations

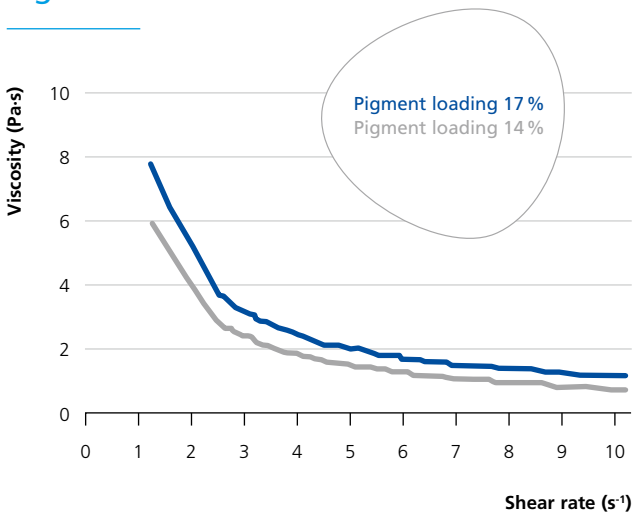
Pigment	BYK-MAX D 4220: % on pigment
Pigment Blue 15:3	25
Pigment Yellow 62	10
Pigment Red 53:1	25

T.01

Increasing pigment loading at constant viscosity

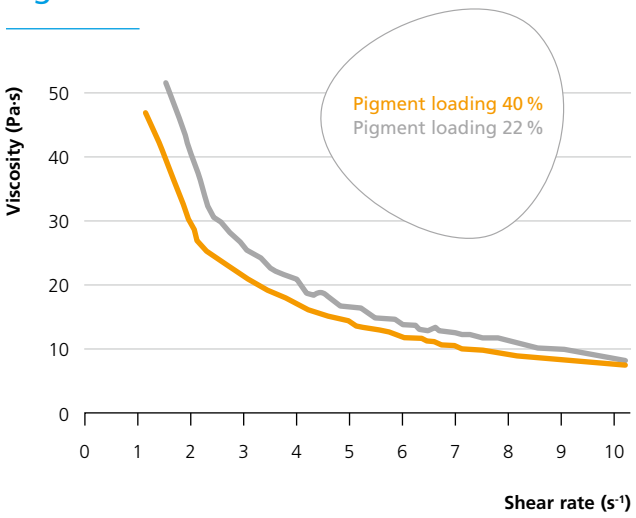
BYK-MAX D 4220 allows higher pigment loading which can lead to lower production costs, a reduced amount of carrier resins in the final application and a higher efficiency of the liquid color concentrate.

Pigment Blue 15:3



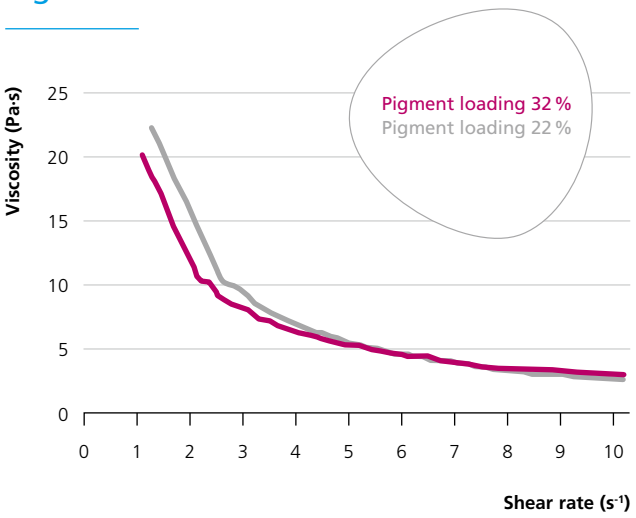
Without additive With BYK-MAX D 4220 G.03

Pigment Yellow 62



Without additive With BYK-MAX D 4220 G.04

Pigment Red 53:1



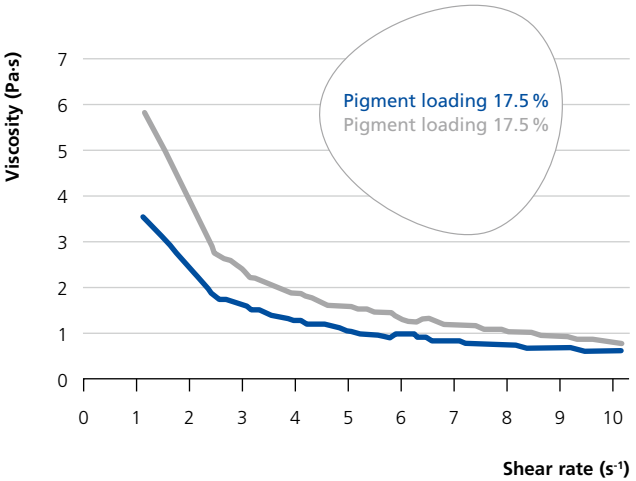
Without additive With BYK-MAX D 4220 G.05

Decreased viscosity at fixed pigment loading

BYK-MAX D 4220 offers a solution for color concentrates based on pigments that are difficult to disperse.

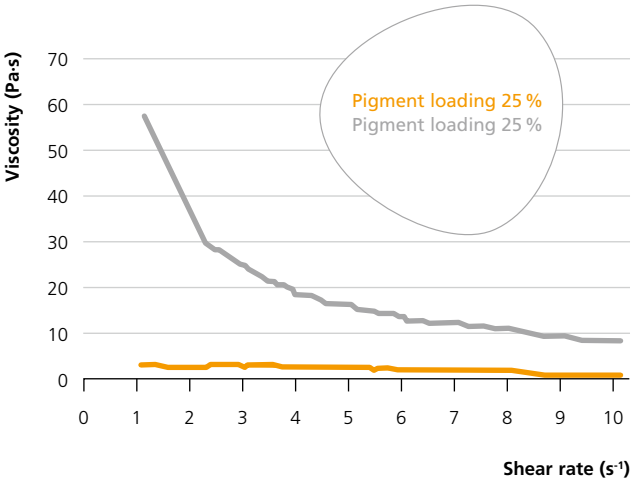
Depending on the pigment used, a dose of BYK-MAX D 4220 (approx. 10–25 %) significantly improves the viscosity profile of the pastes and considerably reduces the viscosity. This allows an easier processing of the material.

Pigment Blue 15:3



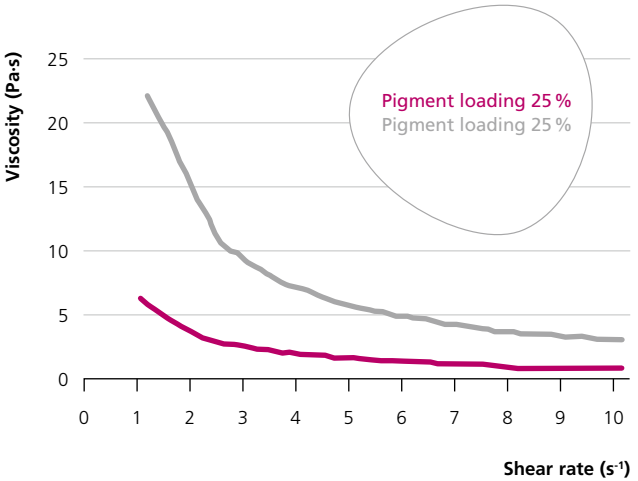
Without additive With BYK-MAX D 4220 **G.06**

Pigment Yellow 62



Without additive With BYK-MAX D 4220 **G.07**

Pigment Red 53:1



Without additive With BYK-MAX D 4220 **G.08**

Additional information

Applications

BYK-MAX D 4220 is a general purpose additive for organic pigment dispersions, such as Lake Red, azo salts, and phthalocyanine blue pigments. In addition, good results have been obtained with certain grades of DPP pigments.

BYK-MAX D 4220 has broad compatibility in different thermoplastic systems including polyolefins, polystyrenes, and polyester.

Regulatory information

For information regarding the regulatory status according to food contact regulation please visit www.byk.com/en/service/regulatory-affairs/food-contact or contact our BRIEF Team.

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