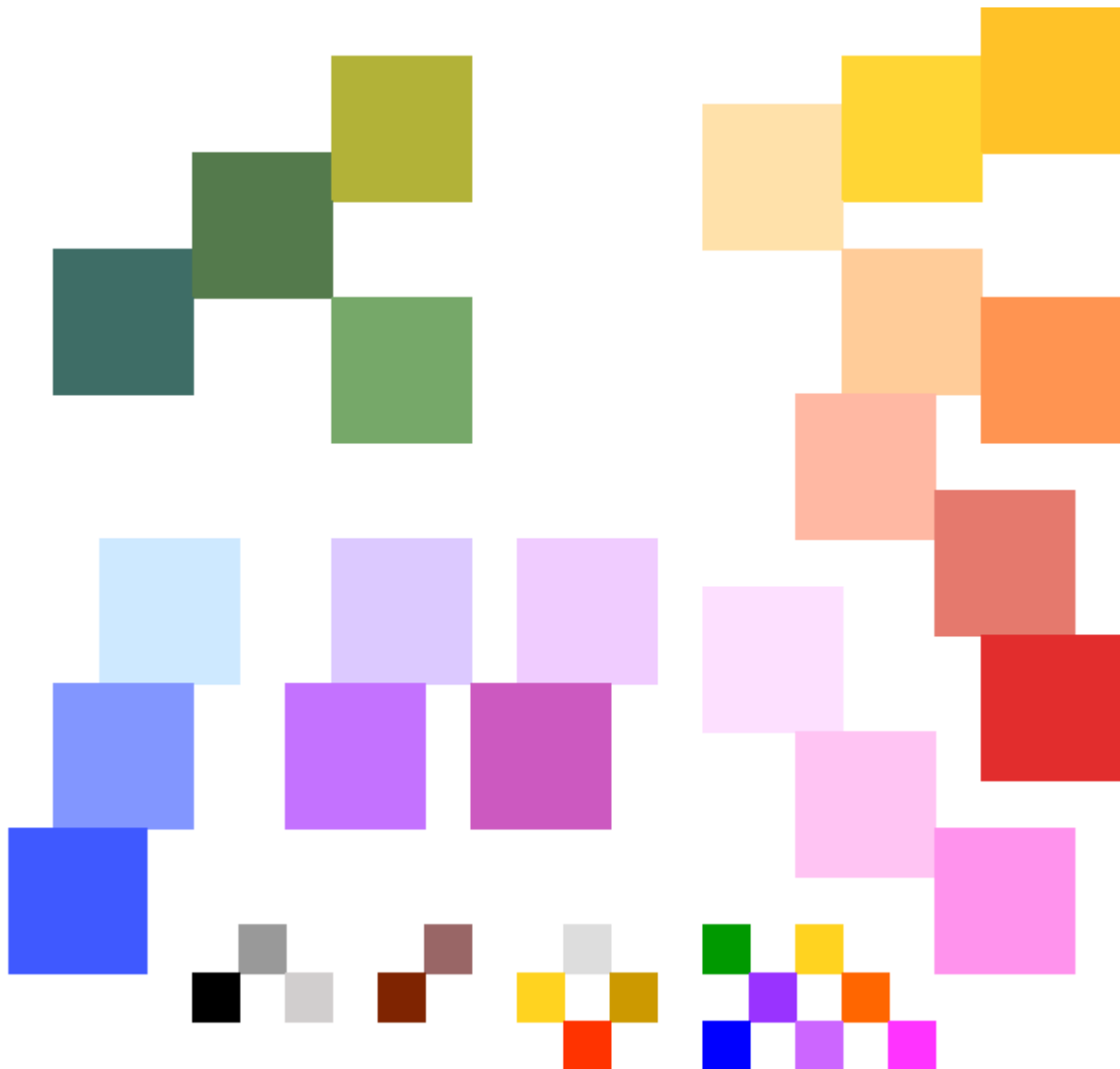


CAPROWAX P™

Masterbatches for Bioplastics/Biocomposites/Blends: PLA, PBS, PHA, PCL, CAPROWAX P™/Blends/BioMineralComposite, Bio-NFC/WPC, Casein, PVOH, Polysaccharides/Derivates, PVAc/Blends, Bio-TPE/UPR, NIPU.

As colourants are used biobased, bio-mineral and/or harmless, inorganic pigments with sustainable, lightfast brightening pigments without Titanium Dioxide. The carrier material is compostable and waterproof.

Colourations of bioplastics comply the specifications of DIN EN 13432.



Albrecht Dinkelaker
Polymer- and Product Development

info@polyfea2.de

www.caprowax-p.eu

CAPROWAX P™ compostable of course



















> COLOURATION <

After successful tests of Masterbatches with your bioplastics or composites your request will be coordinated with toll manufacturer.

Translucent to transparent, pearlescent or full covering colouration:
 Injection- / Vacuum- / Blow- / Compression- / Melt-Moulding,
 Mono-/Multifilaments, Foils/Sheets, Hotmelts, NF-BioComposites,
 Thermoplastic Plasticine, Foams and Coating.






Pigments are biobased, biomineral or calcined, pigmentlike Kaolin and/or of inorganic, synthetic production. They are harmless, lightfast, non-migratory, temperature stable, insoluble in water, comparable with natural, mineral pigments and already mineralised. They are low-dusty incorporated in compostable carrier material and masterbatch pellets are added to different bioplastics in a range of 0,5-6%. Processing at 90-200°C, short time up 220°C. In coloured final products content of each separate pigment is $\leq 1\%$. Colouration of bioplastics comply the specifications of DIN EN 13432.

| CAPROWAX P™ | Shade chromatic | CAPROWAX P™ | Shade chromatic |
|---|---|--------------------|---|
| Red 114 T |  | Red Y 121 T tex |  |
| Yellow 310 T tex |  | Green 427 T tex |  |
| Green 413 T tex |  | Green 426 T tex |  |
| Green AR 430 T tex |  | Blue AR 530 T tex |  |
| Blue G 511 T tex |  | Blue R 516 T tex |  |
| Violet B 616 T |  | Violet R 617 T |  |
| Violet B 630 T tex |  | Violet R 635 T tex |  |
| R: reddish Y: yellowish G: greenish B: bluish T: translucently tex: suited for colouration of filaments LP: Laboratory prototype AR: acid resistant MB500 = 500g sample for process engineering experiments | | | |

Addition of CAPROWAX P - Masterbatches to different bioplastics: 0,5-4%
 Injection- /Vacuum- /Blow- /Compression- /Melt-Moulding, Filaments,
 Foils/Sheets, Hotmelts, Thermoplastic Plasticine, Foams and Coating.
 All shades of colour are comparable or similar to the product colours.

Application projects with pearlescent pigments

For your shortlist: Coloured buttons of MB-Laboratory prototypes (LP) with CAPROWAX P™-Blends on request

| CAPROWAX P™ | Shade | CAPROWAX P™ | Shade |
|-------------|---|-------------|---|
| Gold 9301 |  | Gold 9302 |  |
| Silver 9001 |  | Bronze 9701 |  |
| Rot 9101 |  | | |

Addition of Pearlescent-Masterbatches to different bioplastics: 0,5-6%
 Harmless, pearlescent pigments: Mica coated with TiO₂ and/or Fe₂O₃
 Preferably pearlescent masterbatch Silver 9001 is additive combinable with translucent CAPROWAX P - Masterbatches to yield diverse pearlescent colouration preferably in a proportion of 2:1.

Masterbatches for chromatic, covering colouration

| CAPROWAX P™ | Shade chromatic | CAPROWAX P™ | Shade chromatic |
|---|-----------------|--------------------------|----------------------|
| Red FK 111 | LP | Red 112 lw | |
| Red FK 112 | LP | Red 115 BM ww | LP |
| Red FK 117 | LP | Red FK 130 | LP |
| Red FK 115 | LP | Red 116 lw tex | MB500 |
| Orange FK 205 | LP | Orange 203 BM ww | LP |
| Orange FK 203 | LP | Orange FK 204 | LP |
| | | Orange 204 lw tex | |
| Yellow FK 312 | LP | Yellow 306 BM ww | LP |
| Yellow FK 306 | LP | Yellow FK 320 | LP |
| | | Yellow 307 lw tex | |
| Green FK 441 | LP | Green 418 ww tex | |
| Green 417 ww tex | | Green 416 ww tex | |
| BM: Biomineral, natural Calcium Carbonate lw = ≤ 0,1% TiO2 in coloured polymer | | ww = TiO2 free | FK: Kaolin, calcined |
| tex: suited for colouration of filaments | | LP: Laboratory prototype | |
| MB500 = 500g sample for process engineering experiments | | | |
| Continuation next page >>>>>>> | | | |

Addition of CAPROWAX P - Masterbatches to different bioplastics: 0,5-4%.
 A brightening without Titanium Dioxide is possible. The palette of masterbatches is changed to the eco-friendly, soil-related, calcined, pigmentlike Kaolin (FK) as white pigment. Titanium Dioxide will be used strong reduced only. The biomineral, natural Calcium Carbonate, is used as a dull, white pigment with gentle covering brightening. Sampling see page 7

All shades of colour are comparable or similar to the product colours.
 Injection-/ Vacuum-/ Blow-/ Compression/ Melt-Moulding, Foils/Sheets, Filaments, Hotmelts, NF-BioComposites, Plasticine, Film, Foams, Coating

Your order of CAPROWAX P™ - Masterbatches see page 7

Masterbatches for chromatic, covering colouration

| CAPROWAX P™ | Shade chromatic | CAPROWAX P™ | Shade chromatic |
|------------------------------------|-----------------|------------------------------------|-----------------|
| Green 444 BM ww | LP | Green AR 435 ww tex | LP |
| Green 412 lw | | Green AR 433 ww tex | LP |
| Green FK 440 | LP | Blue FK G 543 | LP |
| Blue G 509 BM ww | LP | Blue FK G 509 | LP |
| Blue G 510 lw tex | MB500 | Blue FK G 512 | LP |
| Blue R 541 BM ww | LP | Blue FK R 542 | LP |
| Violet B 636 BM ww | LP | Violet R 637 BM ww | LP |
| Violet FK B 605 | LP | Violet FK R 608 | LP |
| Violet B 607 lw tex | | Violet R 610 lw tex | |
| Violet B 606 lw tex | | Violet R 609 lw tex | |
| Brown FKV 712 bb | LP | Brown FK 705 S | LP |
| Brown FKV 709 bb tex | LP | Brown 702 lw tex | |
| | | Brown FKV 711 bb tex | LP |

V: vegetable Carbon **bb: biobased** **FK: Kaolin, calcined** **ww = TiO2 free**
BM: Biomineral, natural Calcium Carbonate **lw = ≤ 0,1% TiO2 in coloured polymer**
R: reddish **G: greenish** **B: bluish** **AR = acid resistant** **LP: Laboratory Prototype**
tex: suited for colouration of filaments **S: heat stable up to 220°C**
MB500 = 500g sample for process engineering experiments

Addition of CAPROWAX P - Masterbatches to different bioplastics: 0,5-4%. A brightening without Titanium Dioxide is possible. The palette of masterbatches is changed to the eco-friendly, soil-related, calcined, pigmentlike Kaolin (FK) as white pigment. Titanium Dioxide will be used strong reduced only. The biomineral, natural Calcium Carbonate, is used as a dull white pigment with gentle covering brightening. Sampling see page 7

All shades of colour are comparable or similar to the product colours. Injection-/ Vacuum-/ Blow-/ Compression/ Melt-Moulding, Foils/Sheets, Filaments, Hotmelts, NF-BioComposites, Plasticine, Film, Foams, Coating

Your order of CAPROWAX P™ - Masterbatches see page 7

Masterbatches for achromatic, covering colouration

| CAPROWAX P™ | Shade achromatic | Description |
|---|------------------|---|
| White FK 005 tex | | Kaolin, calcined |
| White C 004 BM ww | MB500 | natural Calcium Carbonate |
| Grey 821 BM ww | | natural Ca-Carbonate / Iron Oxide Black |
| Grey FK 822 | LP | Kaolin, calcined / Iron Oxide Black |
| Grey FK 824 S | LP | Kaolin calcined / Iron Oxide Black (S) |
| Grey FK V 827 bb | LP | Kaolin calcined / vegetable Carbon (tech) |
| Black 801 | | Iron Oxide Black |
| Black 803 S tex | LP | Iron Oxide Black (S) |
| Black V 804 bb | LP | vegetable Carbon (tech) |
| V: vegetable Carbon | bb: biobased | tech = technically LP: Laboratory prototype |
| FK: Kaolin, calcined | ww: TiO2 free | BM: Biomineral, natural Calcium Carbonate |
| tex = suited for colouration of filaments | | S: heat stable up to 220°C |
| MB500 = 500g sample for process engineering experiments | | |

Addition of CAPROWAX P - Masterbatches to different bioplastics: 0,5-4%. A brightening without Titanium Dioxide is possible. The palette of masterbatches is changed to the eco-friendly, soil-related, calcined, pigmentlike Kaolin (FK) as white pigment. Titanium Dioxide will be used strong reduced only. The biomineral, natural Calcium Carbonate, is used as a dull white pigment with gentle covering brightening. Sampling see page 7

All shades of colour are comparable or similar to the product colours. Injection-/ Vacuum-/ Blow-/ Compression/ Melt-Moulding, Foils/Sheets, Filaments, Hotmelts, NF-BioComposites, Plasticine, Film, Foams, Coating

Your order of CAPROWAX P™ - Masterbatches see page 7

Your order of CAPROWAX P™ - Masterbatches

After a successful test with samples at customers your request will be manufactured batchwise by toll manufacturer. Page 7 of 10

CAPROWAX P™ COLOUR PALETTE

See colour palettes page 3-6: **Shades of colours + code**

Technical samples: You can get up to 4 samples a 50g pellets free of charge
For additional process engineering experiments
you can get 500g "MB500 samples" see page 2-5

New MB-Recipes: For your shortlist coloured CAPROWAX P™ - Buttons
of MB-Laboratory prototype (LP) on request.

Supply quantities: 100 kg, 200 kg, 500 kg
+/- 25 kg: After your selection you will get an
offer about location-based, direct delivery

25 kg PE-Bags in carton or on palett
For a better raw material procurement a yearly forecast is required
*) Since corona crisis the delivery of raw material is temporally delayed

Market area: European Union

Prices: According to offer

Payment conditions: According to offer

Delivery date *): after completely delivery of raw material to
the toll manufacturer plus up to 6-7 weeks

Miscellaneous: Product infos and SDS

Informations, quote requests and orders at

Albrecht Dinkelaker

Polymer and Product Development

Blumenweg 2

info@polyfea2.de

D 79669 Zell im Wiesental

Fon: ++49 7625 91 84 58

Banking details/Finance office: On request

VAT-No.: DE165 604 009

CAPROWAX P™ compostable of course



Applications with CAPROWAX P™ materials

Injection moulding



Masterbatches
with compostable carrier material

Vacuum forming Foil / Sheets

Buttons



Hotmelts
Thermoplastic plasticine

Monofilamente



Nature Fibres
BioComposites

Blow moulding



Masterbatch CAPROWAX P™ Blue G 510 lw tex

Compostable carrier material: Bio-Dry-Blend CAPROWAX P 6006-C65 (Intermediate) page 9 of 10

Sample material

Customs-Tariff-No.: 3907 99 80

Customer information

Fon: +49 7625 91 84 58

info@polyfea2.de

www.caprowax-p.eu

Product example

Albrecht Dinkelaker

Polymer- and Product Development

Blumenweg 2

D 79669 Zell im Wiesental

Properties / Data / Description

| | | | |
|---|-----------------|-------------------|---|
| Form | a) 35.08.PV.026 | mm | Pellets, Diameter:1,5-3,0/ Size:2,0-3,5 |
| Content of pigments | b) | % | 25 |
| Colour Index | PB 29 | | Ultramarine Blue |
| Colour Index | PW 6 | | Titandioxide |
| Colour description | c) | | blue, greenish, covering |
| Lightfastness | d) | | 7-8 |
| Bulk density | DIN EN ISO 60 | g/l | 754 |
| Density | DIN EN ISO 1183 | g/cm ³ | 1,21 |
| Residual Humidity (LOD) | 105°C/1h | % | < 0,3 |
| Softening beginning | DSC | °C | 57-63 |
| Remark: tex = suited for colouration of filaments / heatstable up to 200-220°C / acid sensitive | | | |

a) internal test norm / b) Pigment determination proportionally c) 2% Masterbatch in CAPROWAX P 6006 lw = low content TiO₂

d) Data of pigment producer Based on the biological sources different values of measurement could be occur

Description

CAPROWAX P™ Blue G 510 lw tex, a masterbatch with harmless, lightfast, non-migratory, temperature stable, insoluble in water, inorganic pigments partially comparable with natural pigments. Low-dusty incorporated in a compostable carrier material. Coloured bioplastics comply the specifications of DIN EN 13432

Carrier material

CAPROWAX P 6006-C65:

consists of aliphatic, home/industrial compostable, certified polyester and modified, readily biodegradable, renewable, GMO-free plant oil.

MFPA Weimar

Test certificate:P31/029-05

*) calculated

The carrier material is comparable with the test material CAPROWAX P® 6006 DIN EN 13432 tested by MFPA Weimar **83,7% of organic carbon are biobased *)**

No food or feeding stuff

Ecofriendly composition

GM-free, no content of starch or PLA
Without content of aromatic or nitrogenous substances

Biopolymers and use

Covering colouration of bioplastics/biocomposites/blends as PLA, PBS, PHA, PCL, CAPROWAX P™/Blends, Bio-NFC/-WPC Polysaccharides/Derivates, Casein, PVAc/Bioplastic-Blends, PVOH, Bio-TPE, Bio-UPR, NIPU. For use as colouring additive suited for products of agriculture, garden and environment.

Introduction to recipe for reduced content of TiO₂ (lw)

Processing temperatures

Drying pellets on demand

1-2% Masterbatch (MB) homogenous intermixing with pellets yield in coloured products a content of $\leq 0,1\%$ TiO₂

90-200°C (194-392°F) / short time up to 220°C (428°F)

50°C (122°F)/12h Avoid heating melt >90°C over long time

Examples of application

Products of injection moulding, vacuum-/blowforming, foils, hotmelts, NF-BioComposites, support material, substrate, coating

Storage/Instruction

Avoid heat and moisture, storage in original containers only

B O W

CAPROWAX P™ compostable of course

R A I N

S O I L

Carrier material based on CAPROWAX P™ 6006

Page 10 of 10

CAPROWAX P carrier material is a mixture of aliphatic, home/industrial compostable, certified polyesters and modified, readily biodegradable, renewable and GMO-free plant oil.

CAPROWAX P 6006[^]-C65 is produced as a intermediate in powder form and as a compostable carrier material for masterbatches applications. Modified with additives in accordance with DIN EN 13432 and comparable with **CAPROWAX P™ 6006**, examined by MFPA, University Weimar. Test material: **CAPROWAX P® 6006**
Test certificate No.: P31029-05

Total content* of organic carbon: 71,4% *) calculated
From that 83,7% organic carbon* from biobased resources

Portions of carrier material in masterbatches are 60-85%

Maximum range of thermal stability: 180-220°C (356-428°F)

Processing >150°C predrying at 48-50°C/12 h

Ecofriendly: "Free of aromatics and nitrogen, renewable raw materials without genetically modified growing". No content of starch or PLA. No content of food and feeding stuff. (30/2020)

Product surfaces of **CAPROWAX P™**-Material are self-cleaning with water or rain just like lotus flowers. Quick degradation in aerob compost or slow rotting in soil works into biomass, mixtures of soil-related, mineral, inorganic substances, carbon dioxide and water. As well under anoxic/denitrifying conditions degradation occurs fully. In the course of composting the brown to black colour of compost or humus change over to the coloured bioplastic and the colourful appearance disappears. Colourations with bio-mineral Calcium-carbonate-Masterbatches support biogenic weathering in soil and waters.

Product information, quote request, order at:

Albrecht Dinkelaker, Polymer- and Product Development

Blumenweg 2

info@polyfea2.de

D 79669 Zell im Wiesental

Fon: 0049 (0)7625 918458

info@polyfea2.de

Ideas

increase to

pellets

www.caprowax-p.eu

CAPROWAX P™ compostable of course

B O W
R A I N
S O I L