TECHNOLOGIES GmbH
(Switzerland)

MCA® DPP Pigments Technology

MCA Technologies GmbH (Switzerland), June, 2008

Supporting R&D & Business Development in Life Sciences and Specialty Chemicals Industries

MCA® DPP Pigments Technology

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Our humble contribution towards environmental protection & safety in production

Broad Applicability

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- Current status
  - Electronics: Colour filters for flat screens (nano particles)
  - High performance printing inks: Digital printing (nano particles)
  - Plastics: High value-in-use (transparent/easy dispersible)
  - High-performance industrial paints: Tinting systems
  - Automotive: Opaque
- Outlook: Extend technology to other pigments, precursors & fine chemicals

Strong IP Position: Patented Red – Green Production Technology

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- MCA® DPP pigments technology is more cost effective and ecological than current state-of-the-art technology of Ciba (and as imitated now by Clariant, and numerous companies in India and China).
- Claims based on patents granted or to be granted to MCA Technology in all global key markets: EU (granted), China (granted), India (granted), USA (soon to be granted), Japan (pending), Korea (pending).

Key Benefits

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- Lower variable costs
  - Less energy demand
  - Less chemicals demand
- Lower net working capital and fixed asset requirement
  - Lower capacity requirement (higher productivity)
  - No storage and recycling of solvents
  - Less waste
- Less safety risk
  - Less storage and handling of highly inflammable solvents
- Superior end-product quality
  - Nano-particles formed thanks to the absence of solvent

Lower Variable & Fixed Costs

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	State-of-the-Art Technology	MCA® DPP Pigments Technology
Synthesis	3 Reactants + 5 Solvent = 8 units	3 Reactants + 0 Solvent = 3 units
Solvent recycling	5 Solvent x 1.5 (fractionation) = 7.5 units	0 Solvent = 0 units

- Energy demand ratio: almost 5:1!
- Chemicals demand ratio: Almost 2.7:1!
- Reactor capacity requirement ratio: almost 2.7:1!
- No need for solvent recycling!

Solvent-Free Technology: Superior Economics and Ecologics

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- No storage and tedious fractionation of the solvent required for synthesis => lower invested capital required and faster turn-over
- Less waste and no solvent losses => lower production costs and lower invstement in waste management infrastructure
- Less storage and handling of highly inflammable solvents => lower safety risk and precaution & logistics costs

Superior Product Quality Supports Broad Applicability

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- Nano-particles formed thanks to the absence of solvent in the hydrolysis of the isolated sodium salts (product claim of the MCAT patent)
- Specific & controlled particle size distribution for diverse applications
- Narrow particle size distribution allowing for easy dispersibility and better coloristic properties
- Easy “additivation” if and when required, for specific applications

=> Broad applicability also in high-value added industries with specific requirements

Example: DPP Pigments in Electronics

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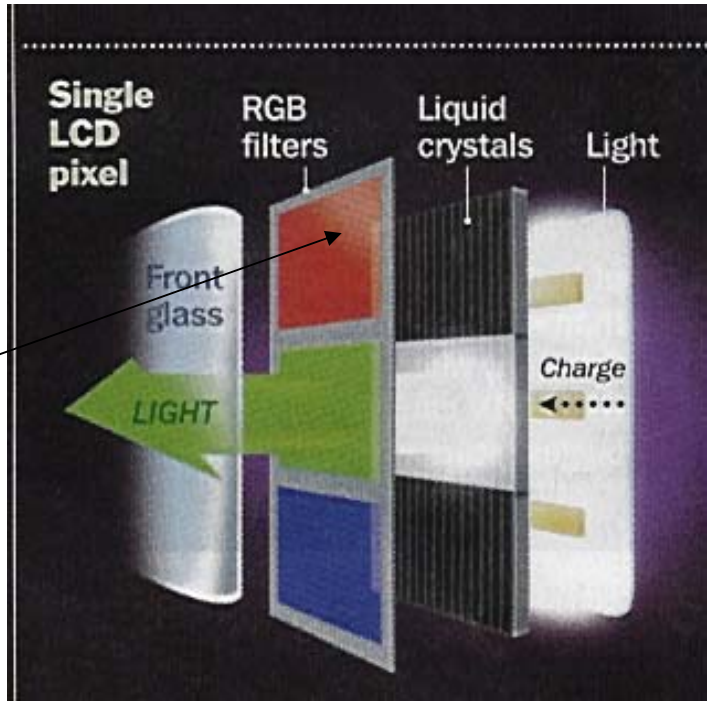

DPP

Pilot Plant in Korea

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DPP 2030: Readily Meeting Specifications of Current State-of-the-Art

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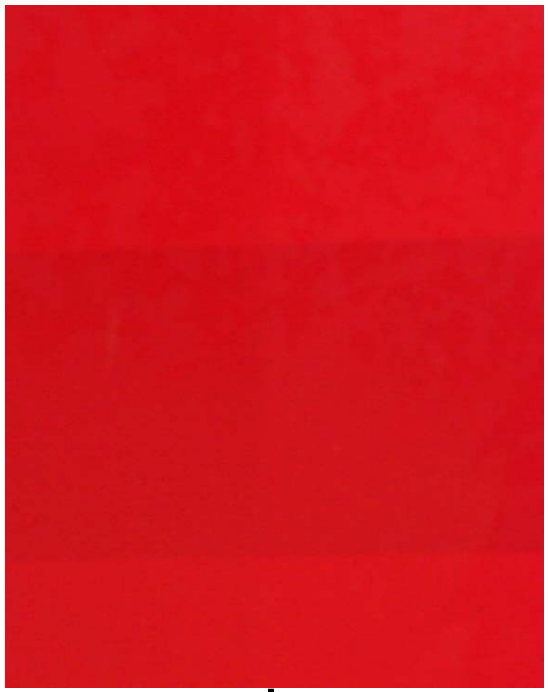

Standard DPP Red 2030 | MCA® DPP Red 2030

(Masstone)

DL: 0.43

DC:0.47

DE:0.68

Standard DPP Red 2030 | MCA® DPP Red 2030

(White Reduction)

DL: 0.46

DC:-0.60

DE: 0.8

Red BO: Readily Meeting Specifications of Current State-of-the-Art

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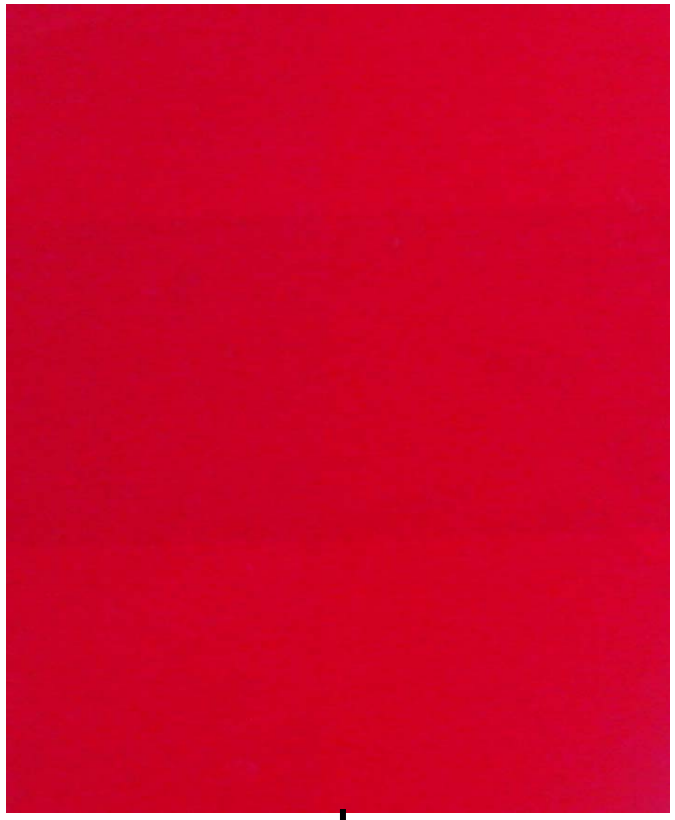

Standard DPP Red BO | MCA® DPP Red BO

(Masstone)

DL: 0.41

DC:1.11

DE:1.31

Standard DPP Red BO | MCA® DPP Red BO

(White Reduction)

DL: - 1.01

DC: 2.16

DE: 2.39

Maintaining Cost & Quality Leadership: Continuous Process Development

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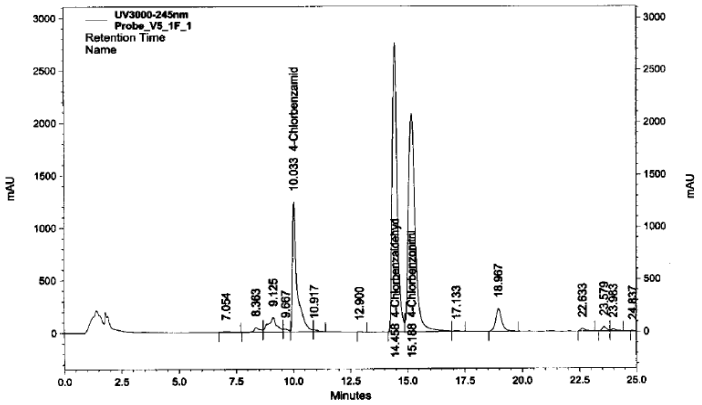
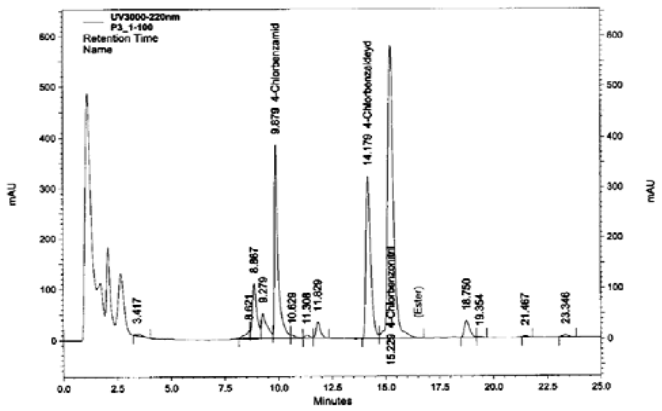
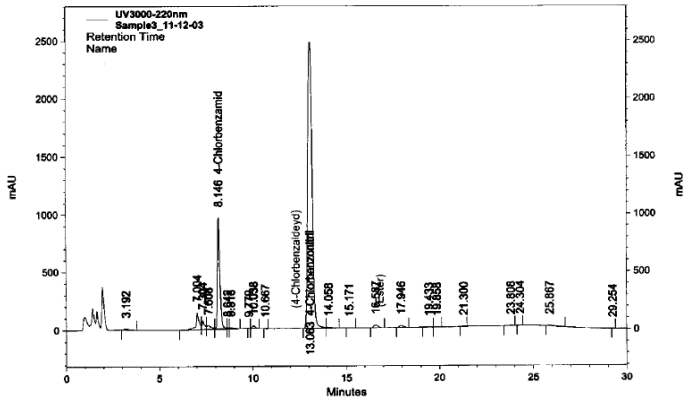


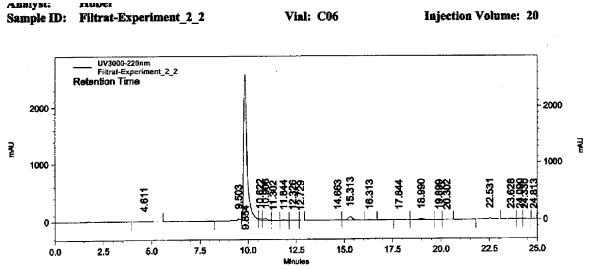
HPLC V5 1F 13.08.03



HPLC Sample-3 03.10.03



HPLC Sample-3 11.12.03



HPLC Expt.2 Sample-3/ 14.04.04

Highly Reproducible

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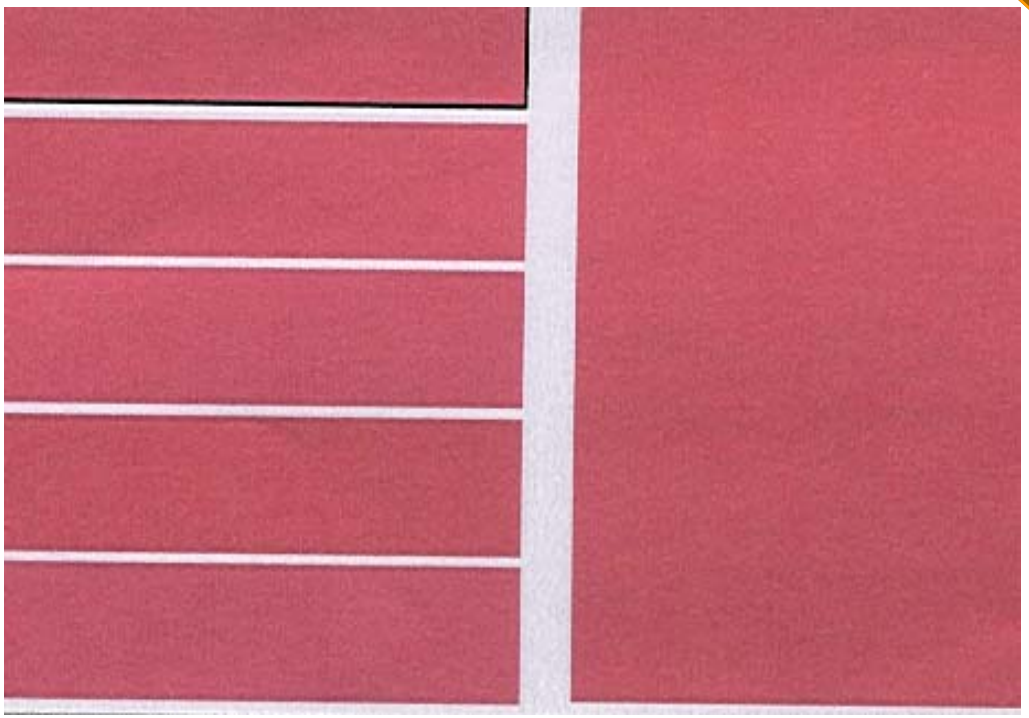

Experiments **Standard**

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Supporting R&D and Business Development Chain in Life Sciences & Specialty Chemicals Industries

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