

Convention on Colorants-2023

HPP : Evolution, Trends and Growth levers

Surendra Gupta

Celebration of Colors: Human Emotions

When color MEETS CULTURE

Color is one of the oldest and most fundamental elements of human culture. Since prehistoric times, humans have used colors to adorn their bodies, their clothes, their homes - as well as their means of travel and transportation. Colors, they knew, would add understanding, value and purpose to their lives.

Culture and colors create a common ground for thoughts and emotions, shared by early communities as well as those of today, despite individual differences in interpretation. Like mobility, color has a unique power to connect people: their hearts, minds and way of thinking.

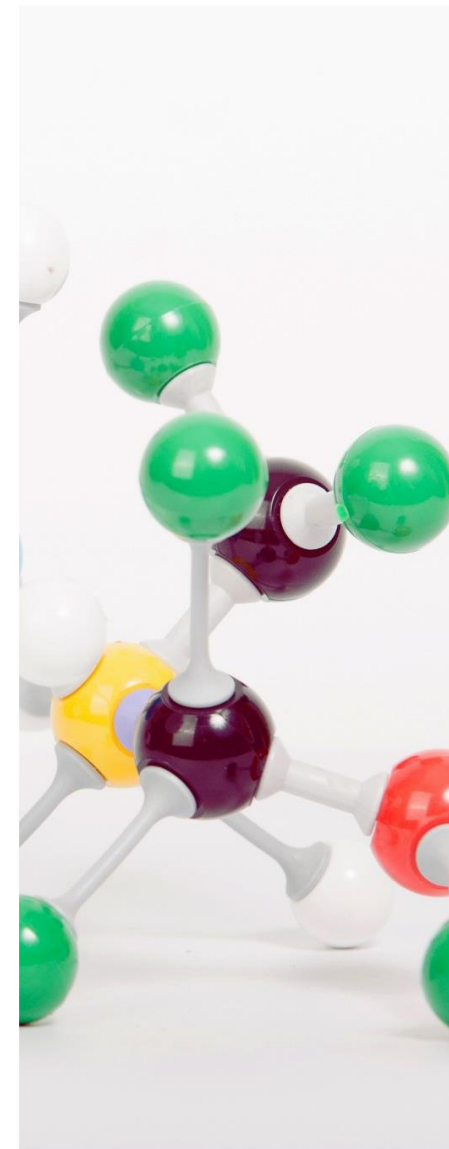
Color arises when objects absorb some wavelengths of light but reflect others. Even how well the eyes are equipped for picking up these waves can differ strongly among people. And what the brain then makes of these signals seems to be an entirely personal affair.

Yet show the members of any culture the beautiful colors on bodies, clothing, houses and cars featured in this book, and they will all respond with the same pleased smiles. We may all see colors differently and give them different meanings. But in this, we are fundamentally alike.

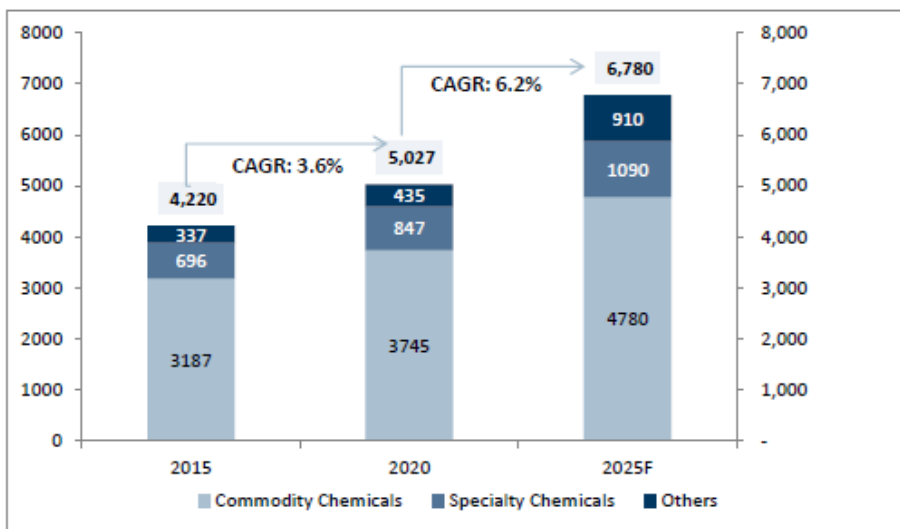


Contents

- ❑ Global & Indian Chemical Industry
- ❑ Specialty Chemical market
- ❑ Colorants Industry
- ❑ Technical Performance criteria of High-Performance Pigments
- ❑ Chemistry and technology tools for elaboration of Organic pigments
- ❑ Heubach group

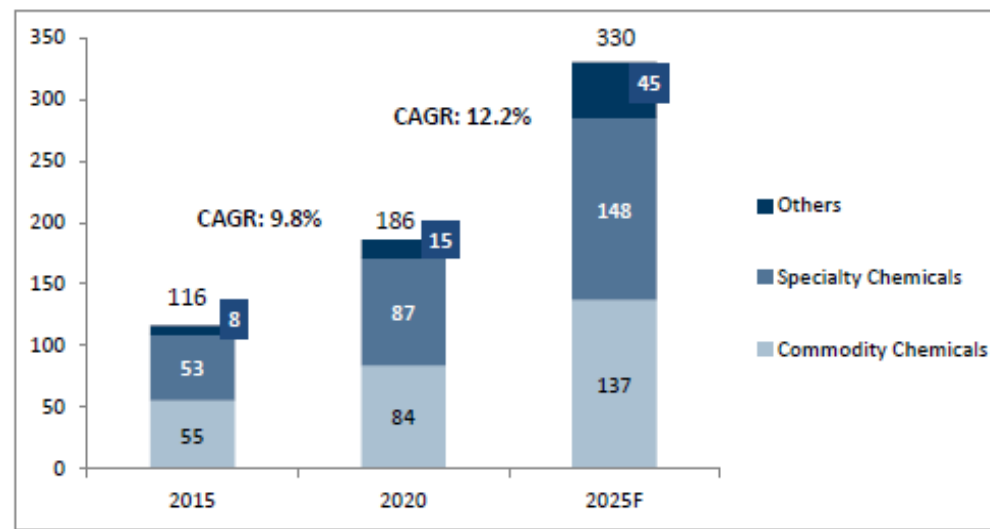


Global and Indian Chemical market



Global chemicals market, 2015, 2020 & 2025F, USD 4,227, USD 5,027 Bn & 6,780 Bn

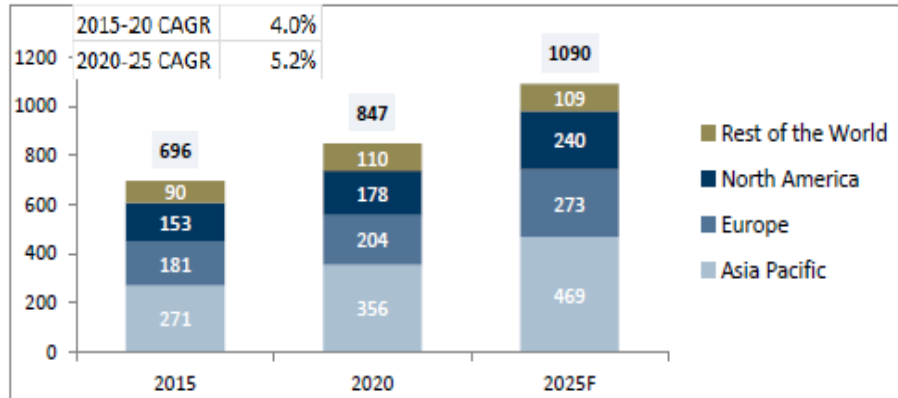
	Commodity Chemicals	Specialty Chemicals	Other Chemicals
2015-20	3.3%	3.9%	5.2%
2020-25F	5.0%	5.2%	15.9%



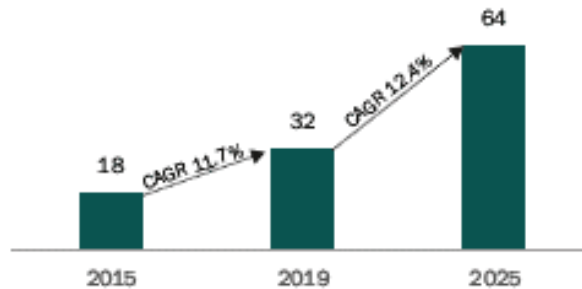
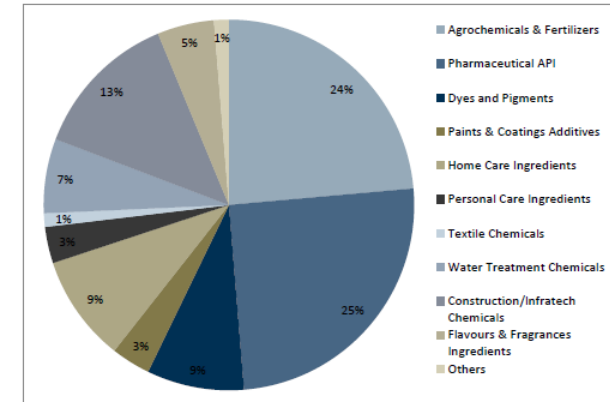
Indian Chemicals Market, 2015, 2020 and 2025F (USD Bn)

	Commodity Chemicals	Specialty Chemicals
2015-20	8.7%	10.4%
2020-25F	10.3%	11.2%

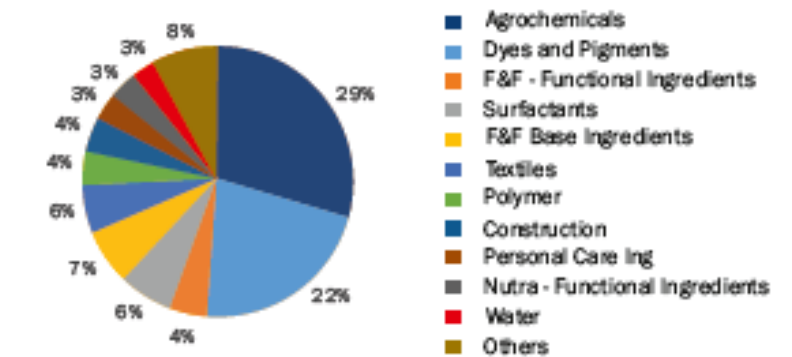
Global and Indian Specialty Chemical market



Global Specialty Chemicals Market by Geography, 2015, 2020, 2025F Value (USD 696, USD 847 Bn, USD 1090)



Indian Specialty Chemicals Market, Value (USD Bn), 2015, 2020 and 2025F

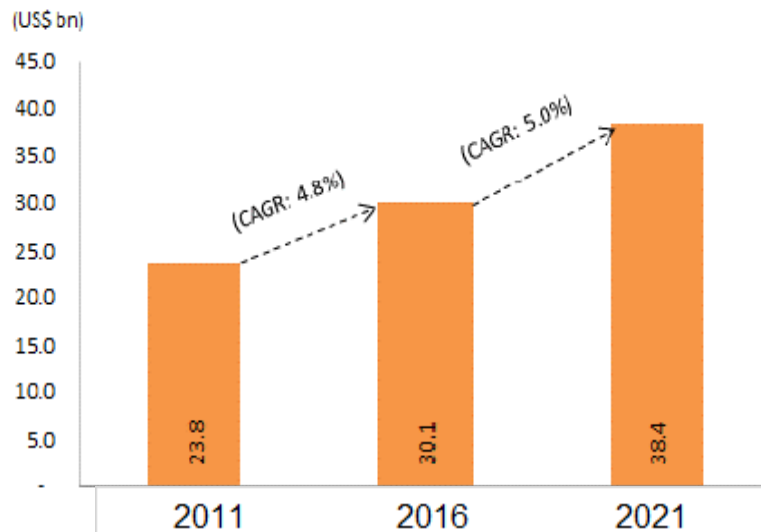


- *Dyes and Pigments: These are inclusive of Reactive Dyes, Disperse Dyes, Acid Direct Dyes, Azo Dyes, Sulphur Dyes, Solvent Dyes, Vat Dyes, Food Colorants, Organic Pigments, Optical Whitening agents, Inorganic Pigments, Pigment emulsions among others*

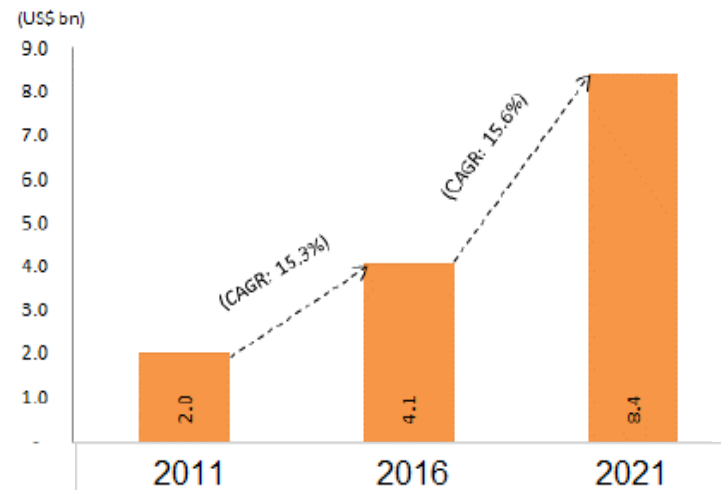


The majority of the Indian specialty market is dominated by dyes and pigments. Furthermore, the segment is likely to rise as a result of the government's objective of establishing more than 100 smart cities, which is expected to drive demand for paints and coatings?

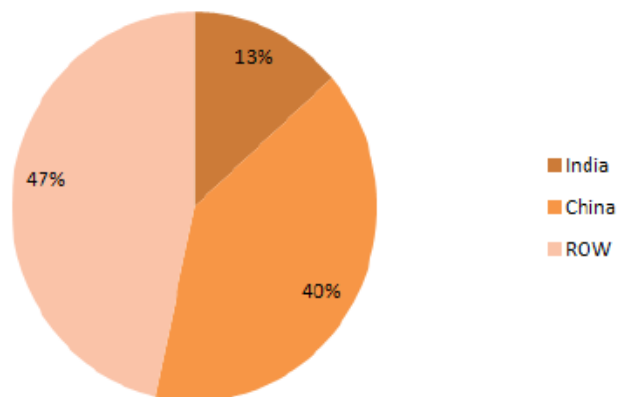
Global and Indian Colorants Industry



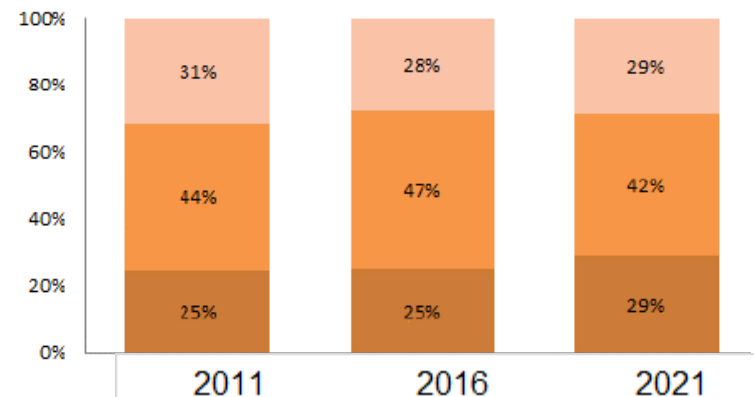
Global, 2021 : US\$38.4Billion



Indian, 2021 : US\$8.4Billion



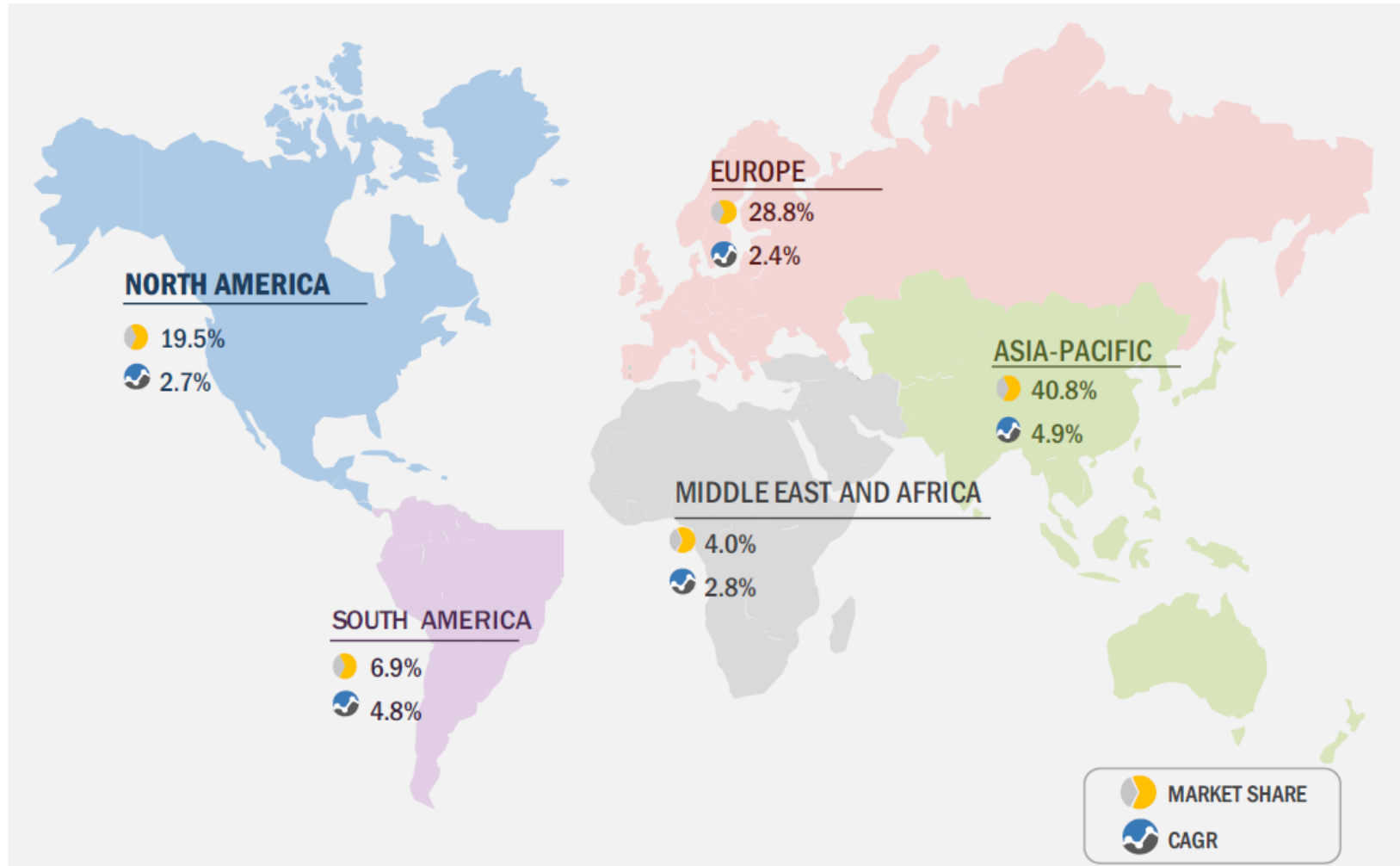
China holds ~40% global colourants share



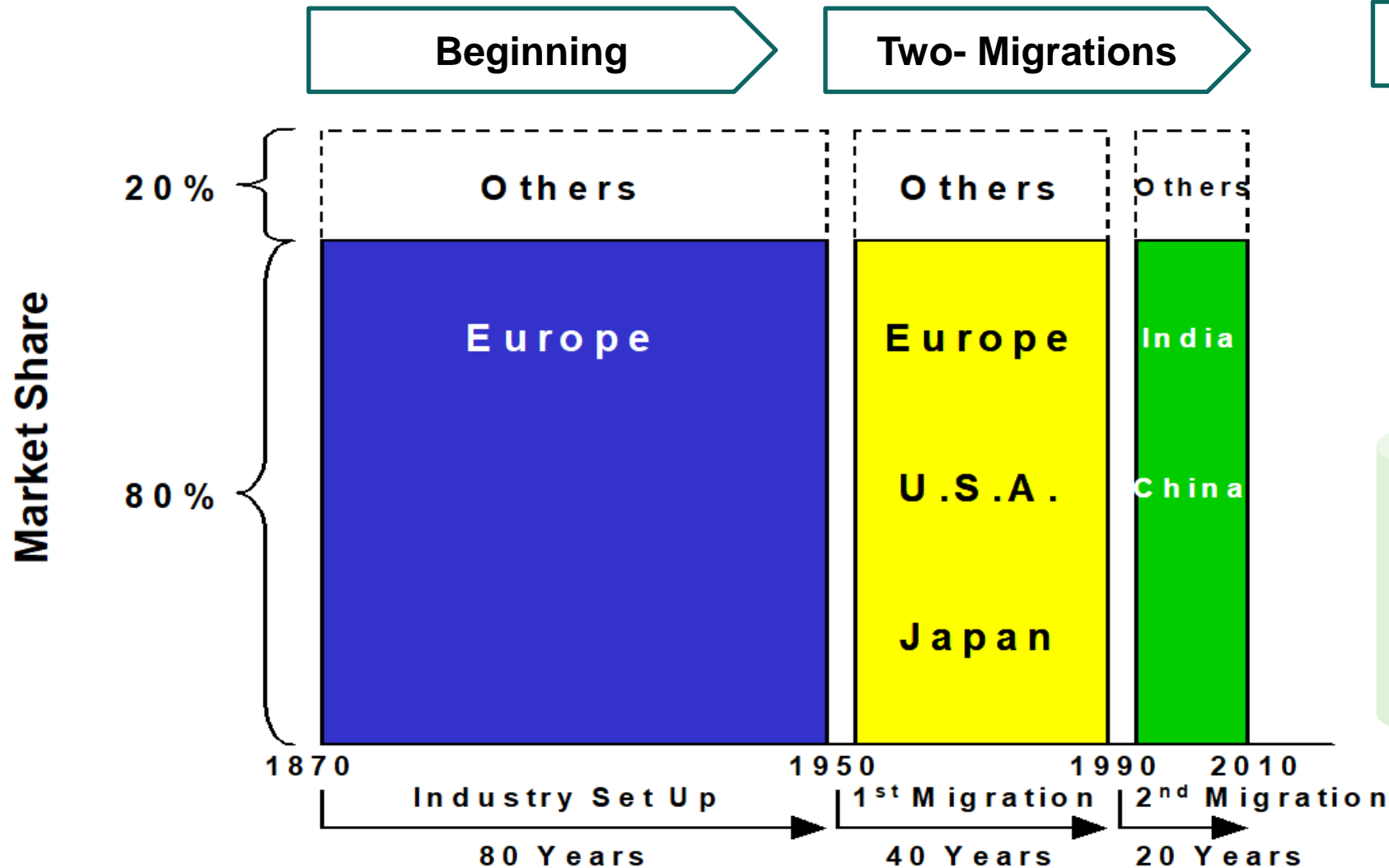
DS DI Pigment

Regional demand

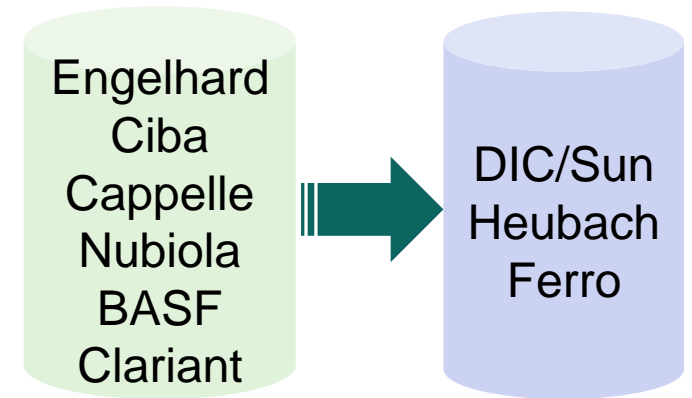
ASIA-PACIFIC TO REGISTER THE HIGHEST CAGR IN DYES & PIGMENTS MARKET



Pigment Industry evolution: Two key migrations



Consolidation (M&A)

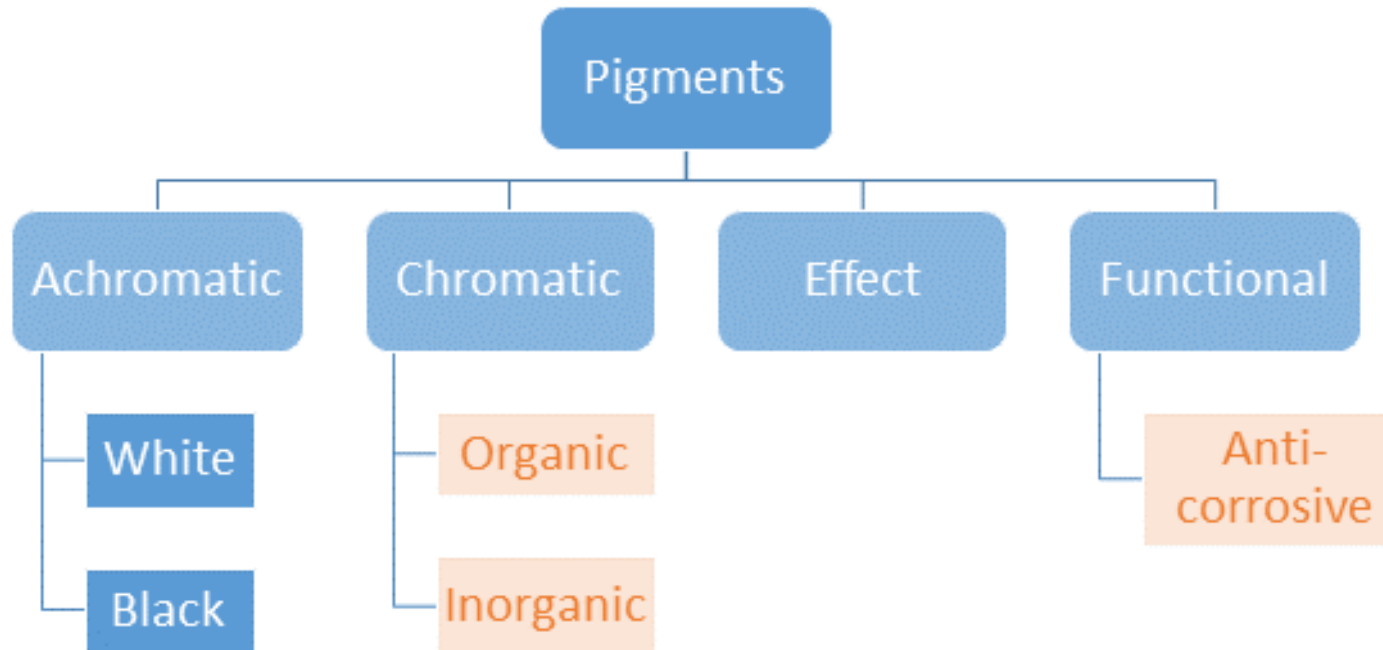


Colorants : Classification

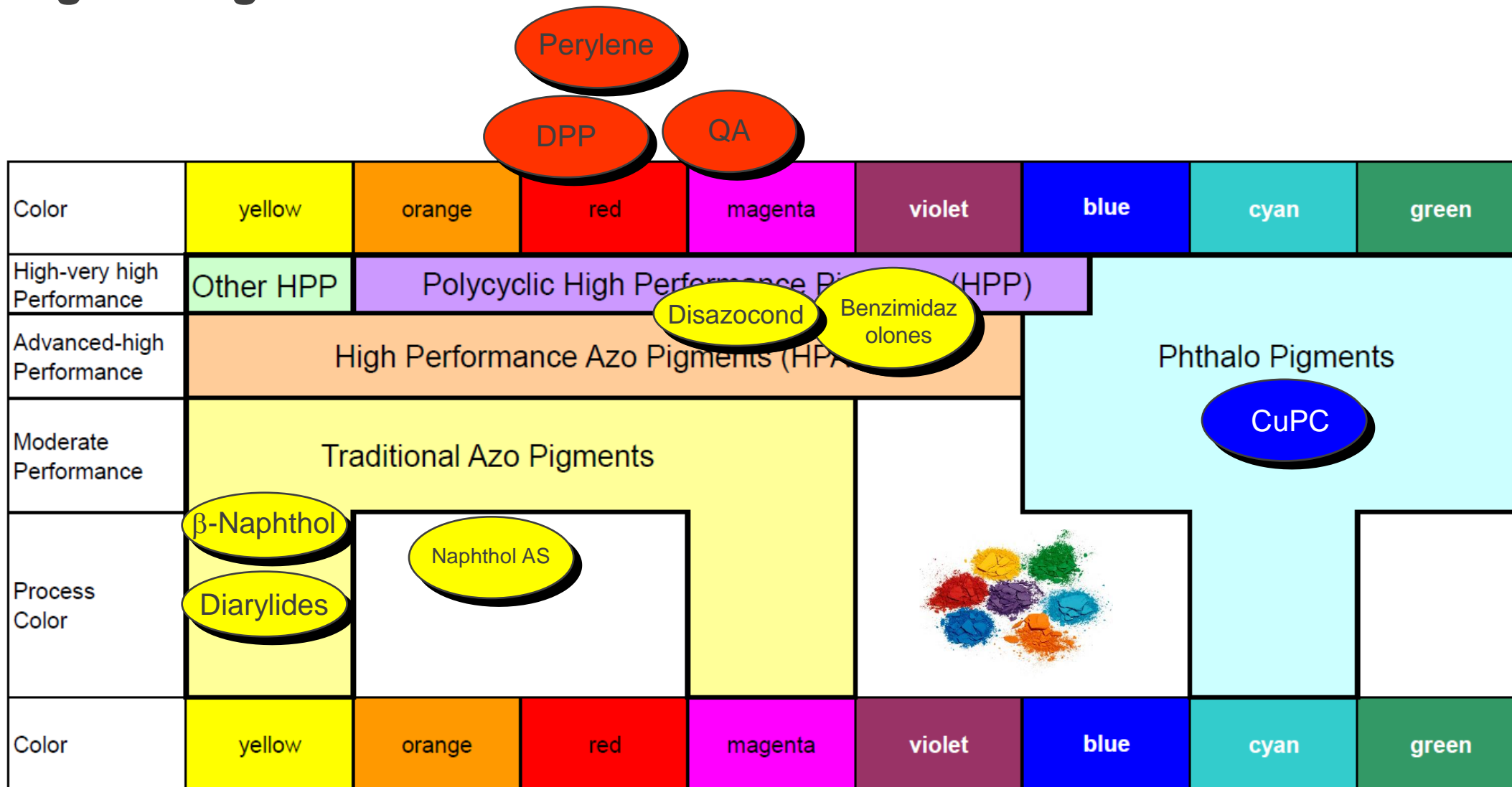
- *insoluble*
- *applied as dispersed crystals*
- *both molecular & crystal structures determine colour*



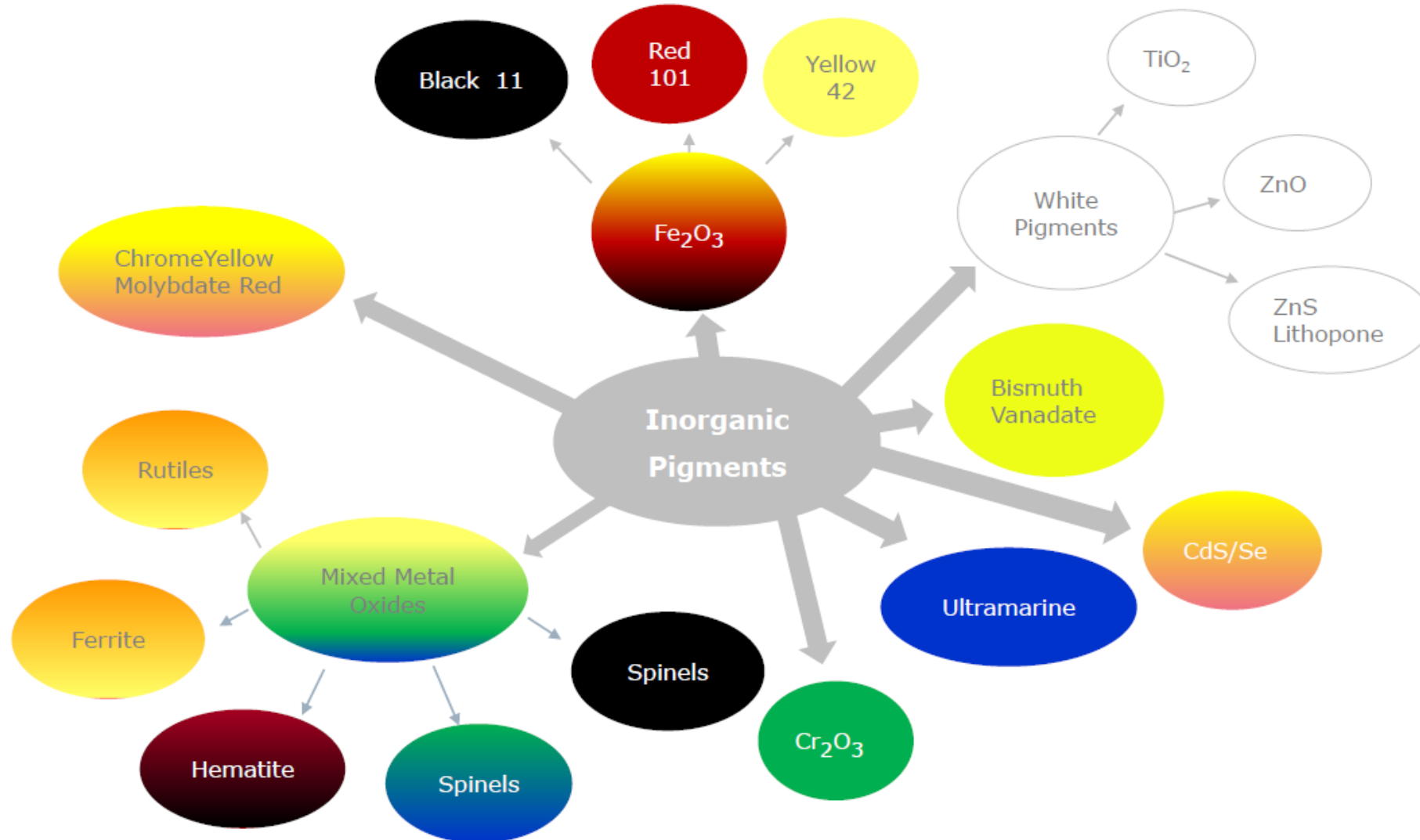
- *soluble*
- *applied from solution*
- *provide colour in mono-molecular disperse form*



Organic Pigments



Inorganic Pigments



Pigment 3-main applications – Inks,Coatings,Plastics & others constitutes few niche markets as Pesonal & Home care

	INKS	COATINGS	PLASTICS	OTHERS	
ILLUSTRATIVE					Others
DESCRIPTION	Pigments used to color inks used for Publication, Packaging, Specialty inks and Non-impact printing applications	Pigments mainly used for Automotive, Architectural, Powder and Industrial coatings	Pigments used for Packaging, Consumer Goods, Construction, Electrical & Electronics and Automotive plastics	Pigments used in particular for Home & Personal care and Seed coloration	E&E
APPLICATION EXAMPLES	Publication inks Packaging inks	Automotive coatings Industrial coatings	Packaging Consumer goods	Home care Seed Coloration	Automotive
					Construction
					Consumer goods
					Packaging
					Wood
					Powder coating
					Automotive
					Architectural
					Industrial
					NIP
					IP - Specialty
					IP - Publishing
					IP - Packaging

Coating Industry: Trends & key drivers

The Core Coatings Functions

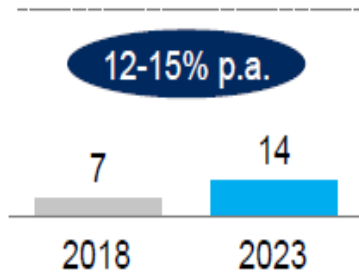
- Protecting
- Beautifying
- Communication



enhance the value and lifecycle of everything coated.

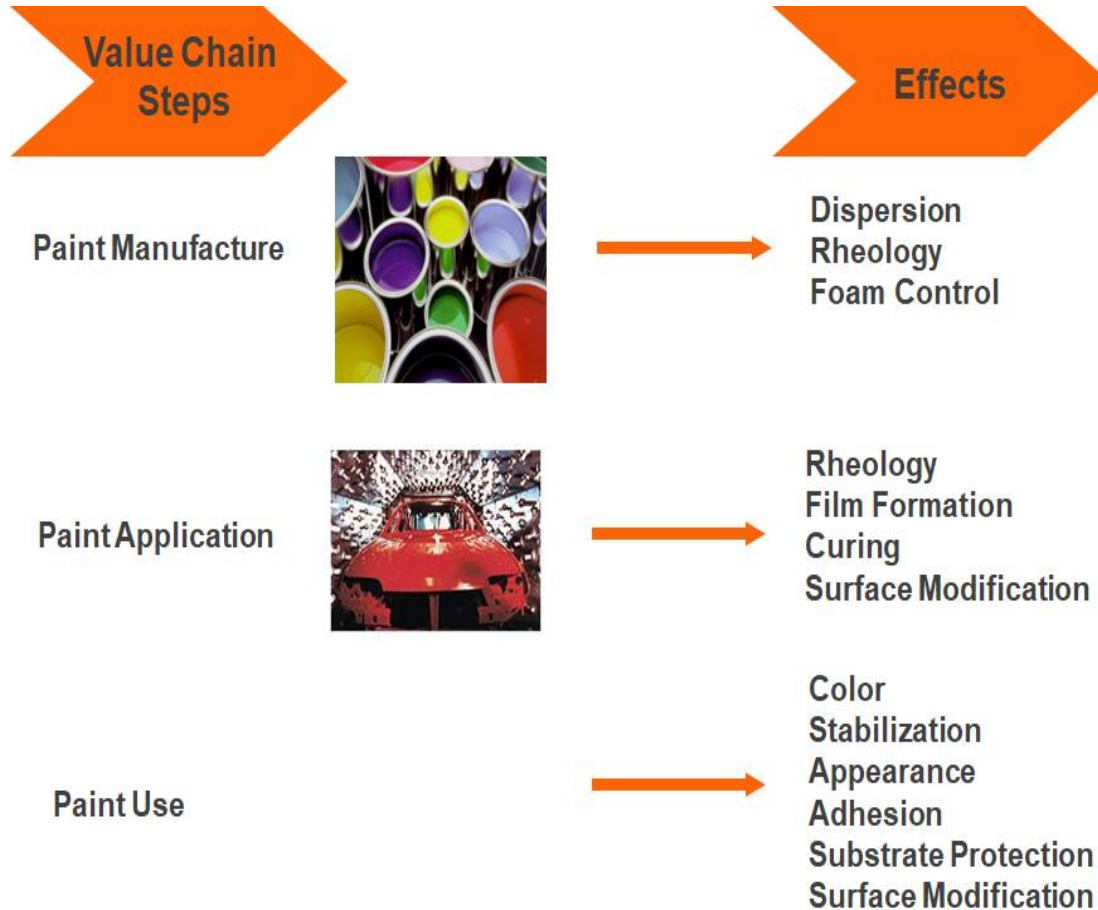
This enhancement adds value far beyond the cost of buying or applying the paint or coating.

Indian Coating Industry



- Increasing per capita consumption due to increased consumer purchasing power and improved lifestyle
- Growth driven by in automotive and construction markets

Coating Industry: Value Chain



Growth drivers for decorative sectors

1. The regular release of sustainable and eco-friendly products to the market
2. Stimulating the purchase of coloured paints.

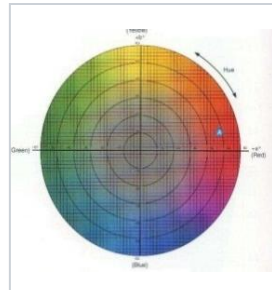
Eco-friendly Products →

- ✓ Environment Context
- ✓ Stringent regulations and Social awareness
 - a. Low – Zero VOC: Water borne formulations
 - b. Reduce carbon foot print
 - c. Implementing “greener” processes

Coloured Paints → More profitable

- ✓ Technology based: bringing large number of Colours to consumer
- ✓ Marketing driven: Enhancement of customer wellbeing perception – living in colourful surrounding

Colorant selection criteria



1) Shade-purity



2) Transparency - Opacity



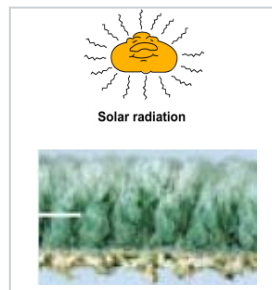
3) Thermal stability



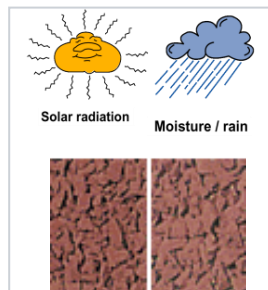
4) Migration stability



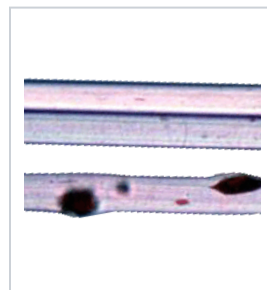
5) Dimensional stability



6) Light stability



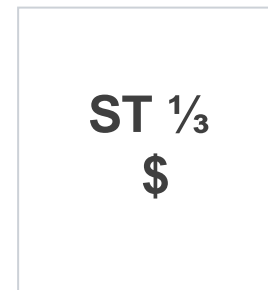
7) Weather stability



8) Dispersion quality



9) Regulatory



10) Coloration costs

Organic Pigments: New developments

Technical Performance Parameters = f {Pigment Chemistry + Physics}

- Pigment Chemistry = Molecules **Molecular Properties**
- Pigment Physics = Crystals **Solid State Properties**

- Colour Properties:** e.g. shade, strength, color depth, Chroma, opacity/transparency, metameres

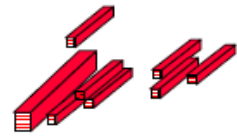
- Fastness Properties:** light, weather, heat, chemical, solvent, migration (blooming, bleeding, plate-out, chalking, etc.)

- Application Properties/Requirements:** rheology, viscosity, dispersibility, dispersion stability

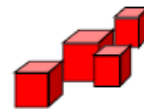
- Current trend is to improve **application properties** of existing pigments in place of new **molecule research**. More focus and investment in development rather than basic research

Organic Pigment : Influencing factors

What can Pigment Producers influence ?



Crystal



Surface

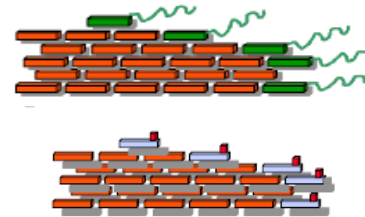
Colour Strength
Transparency

Chemistry

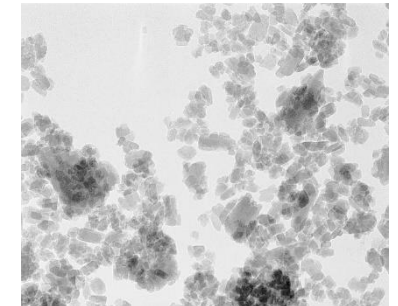
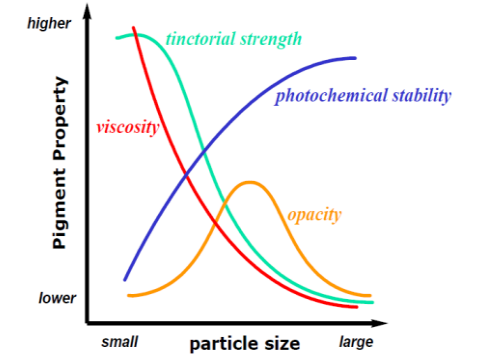
Primarily the hue is defined by a pattern of **chromophores** connected to a system of conjugated double bonds:
 $-N=N-$ $-CH=N-$ $-NO_2$ $-C=O$ $-$
 $N=NO-$ $-CN$

In addition electron donors and acceptors modify the preliminary hue

$-NH_2$ $-NHR$ $-NR_2$ $-OH$ $-CH_3$
 $-OCH_3$ $-Cl$



Dispersibility
Flocculation



Shade
Fastness
Cost

➤ New Pigment Development :

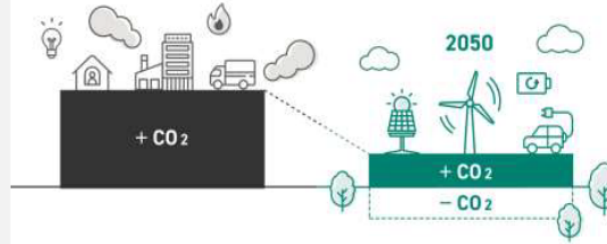
- Solid solutions through Mixed Coupling
- New Crystalline modifications
- Changing particle morphology, i.e. shape, size & particle size distribution.
- Modifications of pigment surface with a broad array of surfactants, additives & auxiliaries.

Mission Net- Zero : Carbon neutrality

Increased social demands on companies for a sustainable society

[Carbon neutral by 2050]

Global initiatives to reduce and absorb greenhouse gas emissions to virtually zero by 2050
(Example: Paris Agreement, COP26)



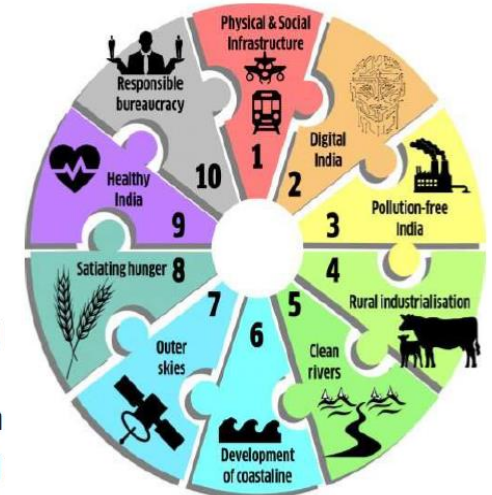
[Promotion of SDGs towards 2030]

17 global goals to be solved by 2030
(Example: Climate, human rights, hunger and poverty)



The sustainable development of 1/6th of humanity will be of great consequence to the world and our beautiful planet – by India PM Modi

- Planning and Execution by NITI Aayog - Indian Government's premier think tank.
- Proper financing and subsidies to achieve the SDG's 2030.
- The Indian Government using SDGs as a roadmap for formulating national policies and regulations. Very soon most of the companies in India will also have their mid to long term plan set based on the SDG's.



10-point agenda to achieve the India's Vision by 2030 which will contribute to the 17 SDG's set by UN for 2030 vision.



RRR – Reduce/Reuse/Recycle Circular Model

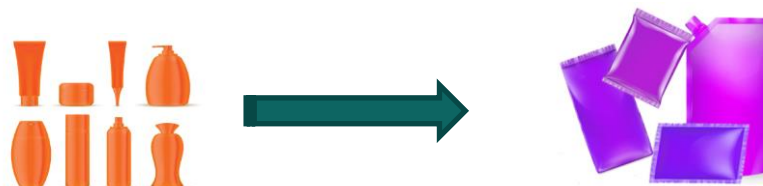
Reduce → use less



Reuse → use again



Recycle → make something new



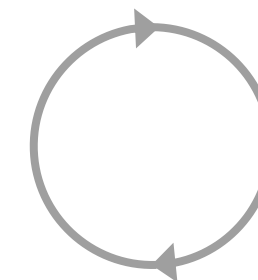
Linear model

- Disposal of molecules at end of lifecycle (energy recovery, landfill, etc.)



Increasingly “bent” models

- Partially renewable feedstock and energy



Circular model (total recovery)

- Full reuse of molecules - with or without modifications of molecular bonds
- Design to reuse for most end products
- Climate neutrality

Heubach Group: the new pigment powerhouse



**Brighter ideas for
brighter
innovation**



200 years of excellence and an unparalleled network of **technical experts** and **application specialists**

**Brighter solutions
for brighter
businesses**



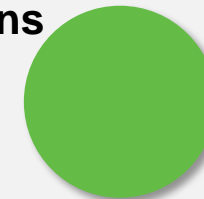
The **broadest portfolio in the industry** with complete lines of organic and inorganic pigments, preparations, dyes and anti-corrosives

**Brighter network for
satisfied
customers**



Strong **geographic footprint** and **customer proximity** with operations and distribution network in all regions

**Brighter visions
for a brighter
planet**



Constantly thriving for the **highest standards** in quality, sustainability and integrity

Our foundation: bringing together the best of two worlds (Clariant BU Pigments and Heubach legacy)

Heubach has a long and unique history

Heubach

1806: The beginning of the Heubach pigment business with the foundation of Goslarer Farbenwerke



1988: Heubach US



1994: Heubach Color India

2022: The New Pigment Powerhouse

1863: Organic pigment factory in Hoechst



1869: Expansion of the factory and foundation of what is today known as Industriepark Hoechst

1997: Clariant forms the BU Pigments based on acquisitions from Hoechst AG and Cookson

Clariant BU Pigments



Heubach at a glance: key figures

2nd

Largest pigment
producer globally

~ **100**
countries

~ **4000**
customers

~ **3000**
employees

19
Production
sites

10
technical
centres

~ **2000**
products

We leverage the best quality management in the industry

High standards and benchmarking across all our global facilities

Heubach applies industry leading standards and benchmarking in all our manufacturing, quality management and supply chain activities. We are committed to reliable supply of high-quality materials to meet your demanding production environments.



Collaborating with you to help you meet your own sustainability & environmental goals

We are a pioneer in the development of sustainable color technologies, including bio-based materials and the substitution of questionable materials to improve environmental characteristics and spearhead regulatory compliance.

Sustainability is a key priority for us, and for our customers

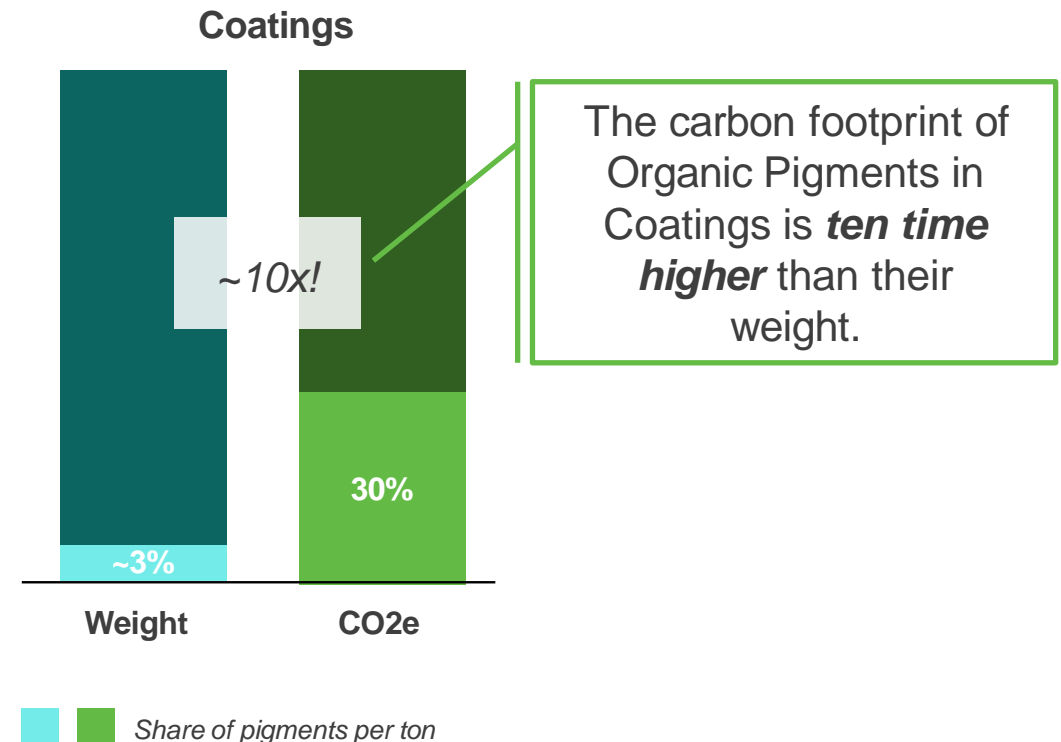
Sustainability and sustainable innovation are key priorities for us ...

We stand for **responsible use of natural resources** and are committed to **meet the needs of our planet**

We see sustainability as the **central business und innovation driver**

Our focus is to become the **partner of choice for industry leading sustainable products**

... because our products can make a significant contribution for the planet



We are working actively on reducing the footprint of our production ...



- We produce **Aluminum Hydrotalcite** with a unique **Eco-Green synthesis** process
- This and our integrated waste management system **reduces** solid waste **by 85%**
- We are the **only producer of Phthalo Pigments** with this setup



- Pigment production is very **energy intense**
- Heubach invests significantly in initiatives to **reduce power consumption**
- For example, in our site in **Ankleshwar** our own **wind turbines** produce **~25%** of the total energy consumed



- We introduced a **vacuum filling technology** that allows to **reduce packaging by 50%**
- This leads to **less waste, less storage space**, reduced transportation, **lower CO2 emissions**

... and our products contribute to reduce the footprint further down the value chain



- **Anti-corrosive pigments** protect steel against rust.
- This considerably **extends the life span** of structures such as offshore wind parks.
- For **sustainable energy production**.



- We have been developing and producing **water-based pigment preparations** for various applications for over 30 years
- These modern water-based products contain **no solvents** and are therefore particularly **environmentally friendly**



- Heubach's **black colorants** allow the identification of polymer by the Near-Infrared technology sorting devices
- With this, we offer a solution for **recycling black plastic**

Heubach commits publicly and reliably to sustainability

WE SUPPORT



We support the **UN Global Compact** and are committed to implement the 10 principles.



More than 90% of our production are certified by **ISO standards** (9001, 14001 and 45001)



More than 50% of our production sites are certified by **Responsible Care**



Taking responsibility along the value chain: we partner with ecovadis to assess risks and to ensure compliance



Carbon Footprints certified by TÜV Rheinland

We are looking forward to partnering with you!

Sophisticated, multi-faceted capabilities that can meet all your objectives

- Broad portfolio
- Global production
- Sustainable practices
- Quality standards
- Applications expertise
- Specialized technology
- Supply chain excellence