



SOLVAY

asking more from chemistry®

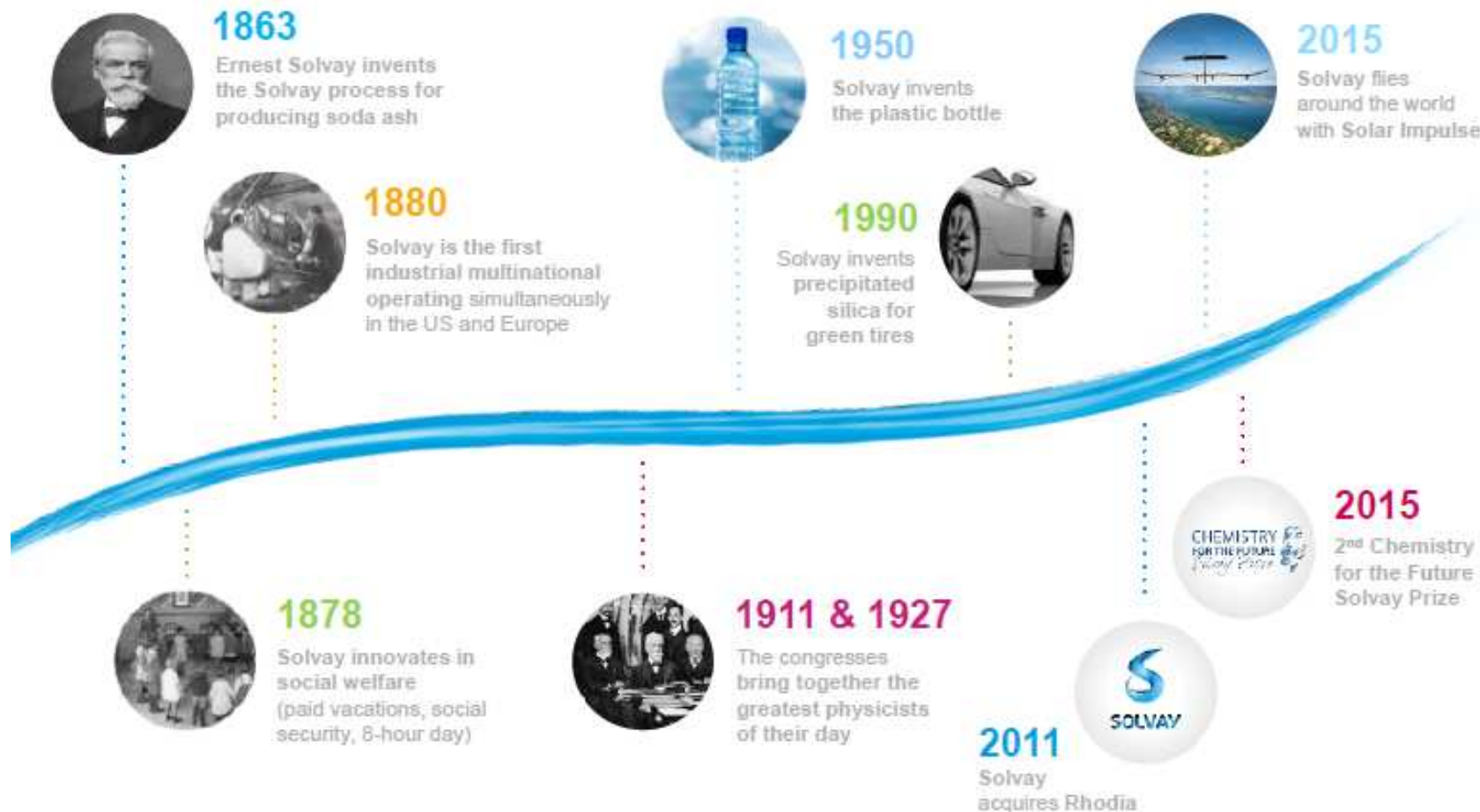
Solvay Amine Polyurethane Catalyst



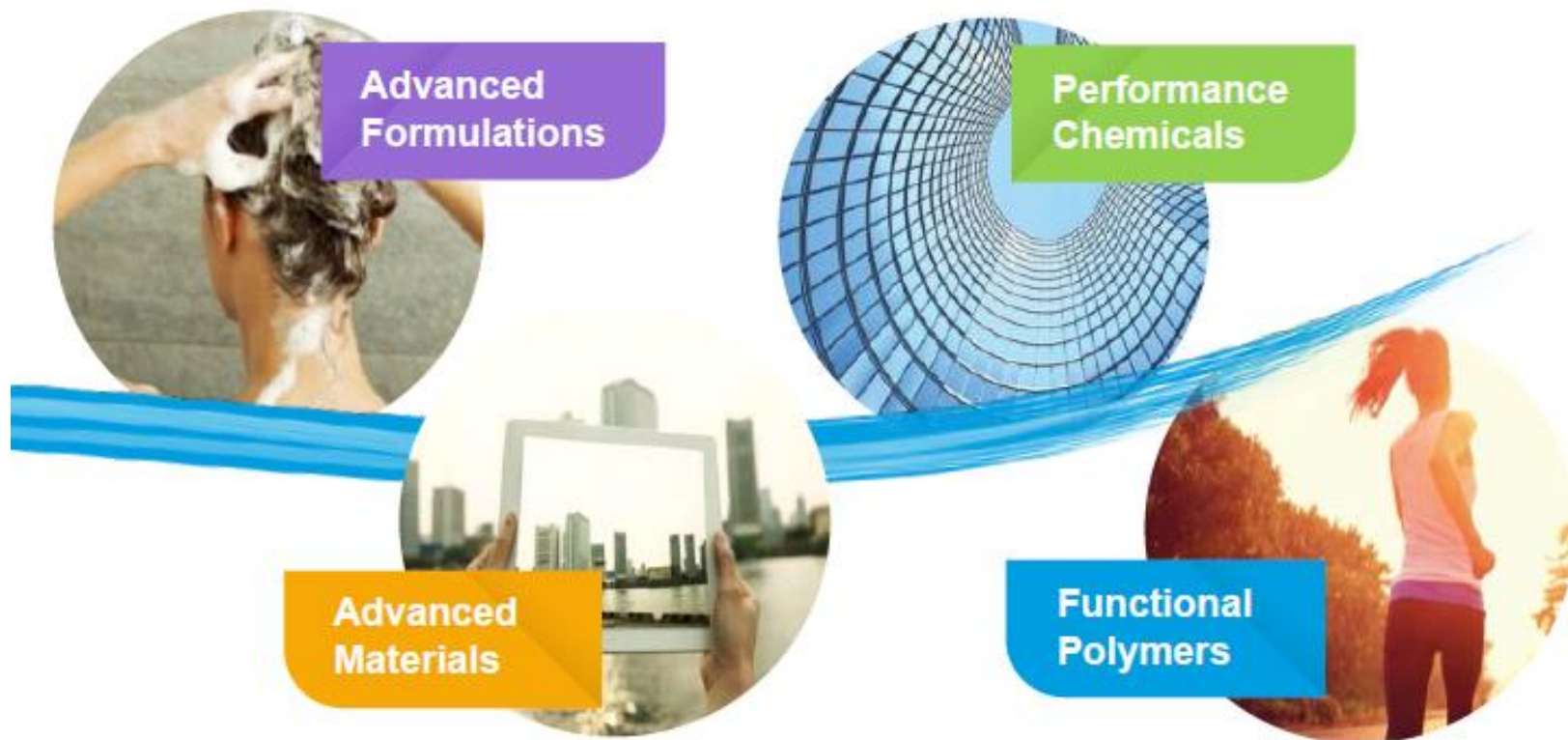
Novecare

June. 2016

150 years of innovation and many to come



Our activities are divided into **Operating Segments**



Solvay's Global Business Units are grouped into 4 clusters

Advanced Formulations



3 GBUs

Net sales: € 2,885 million
18 % REBITDA margin
REBITDA: € 522 million

- More original formulations
- More products of natural origin
- More growth
- Global leaders

Advanced Materials



4 GBUs

Net sales: € 4,503 million
24 % REBITDA margin
REBITDA: € 1,079 million

- More technology
- More performance
- More growth
- Global leaders

Performance Chemicals



4 GBUs

Net sales: € 3,052 million
25 % REBITDA margin
REBITDA: € 770 million

- More volumes
- More competitiveness
- More services

Functional Polymers



3 GBUs

Net sales: € 1,926 million
10 % REBITDA margin
REBITDA: € 190 million

- Focused on polyamide chain
- Major areas of development: competitiveness improvements and opening of new markets thanks to innovative solutions

Pro forma 2015 figures including Cytec (unaudited)

Advanced Formulations



Novecare



Products

Amines, surfactants,
polymers, biopolymers,
phosphorus derivatives

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Applications & markets

Cosmetics, detergents,
paints, crop protection,
mining, oil & gas

Technology Solutions



Products

In process separation,
phosphorus derivatives,
polymer additives &
formulated resins

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Applications & markets

Mining, automotive, oil & gas,
marine, renewable energies

Aroma Performance



Products

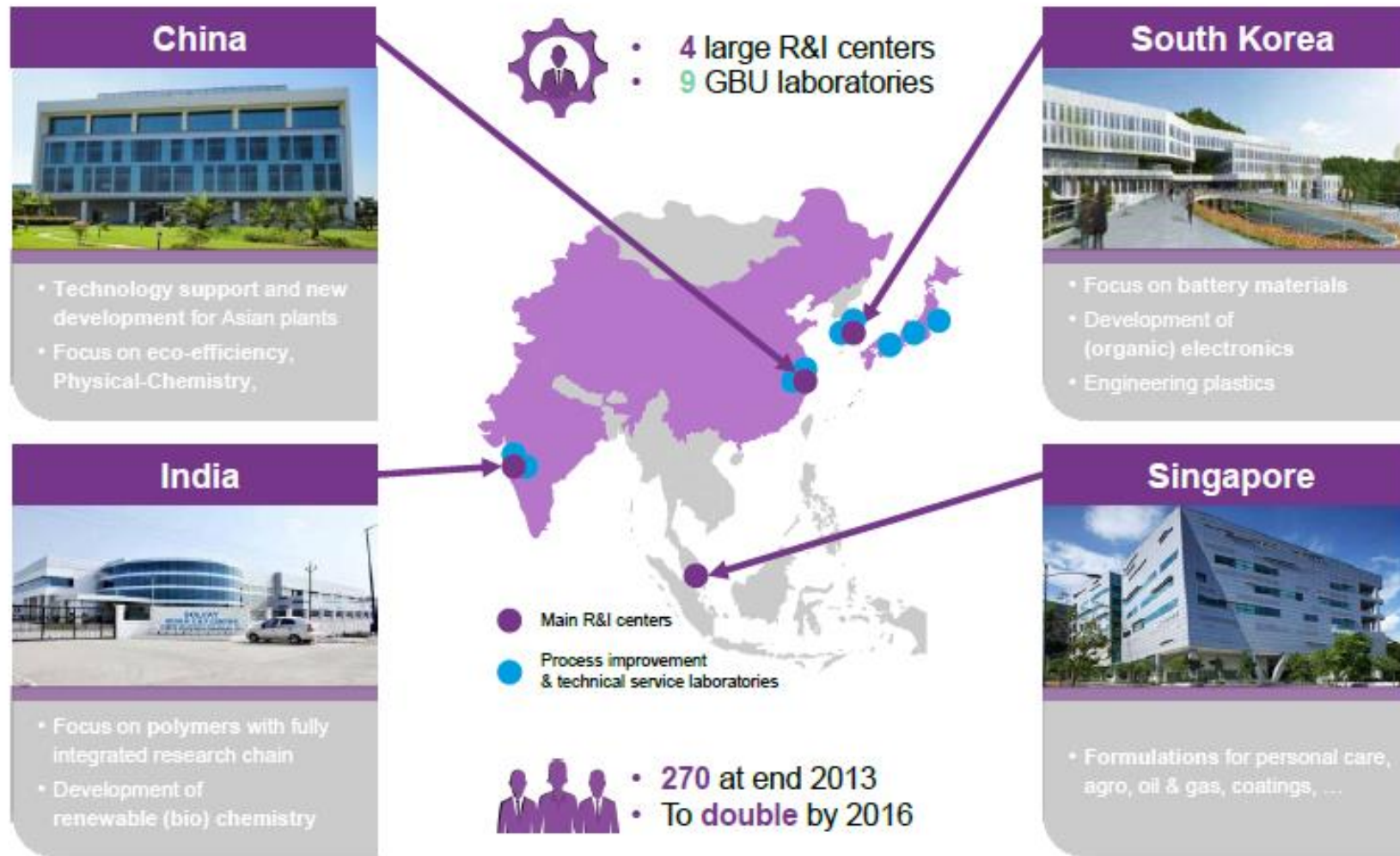
Vanilla flavors, diphenol &
derivatives

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Applications & markets

Pharmaceuticals, food
industry, agrochemical,
petrochemical

Supported by solid R&D setup in Asia



Solvay Amine Chemicals Overview

- **China's leading producer of specialty amines and surfactants**
 - No.1 in China
 - Among top 3 players worldwide in specialty fatty amines
- **Production sites**
 - One production site at ZhangJiaGang (closed to Shanghai) ISO-certified plant
 - Cationic surfactant plant in South of China (Zhuhai / Guangdong)
 - New non-ionic (alkoxylated) surfactant plant in Singapore
- **Product ranges**
 - Fatty amines
 - Specialty amines
 - Cationic surfactants
 - Amphoteric surfactants
 - Non-ionic surfactants



SZJG site

Polyurethane is improving our life

**MORE
EFFICIENTLY**



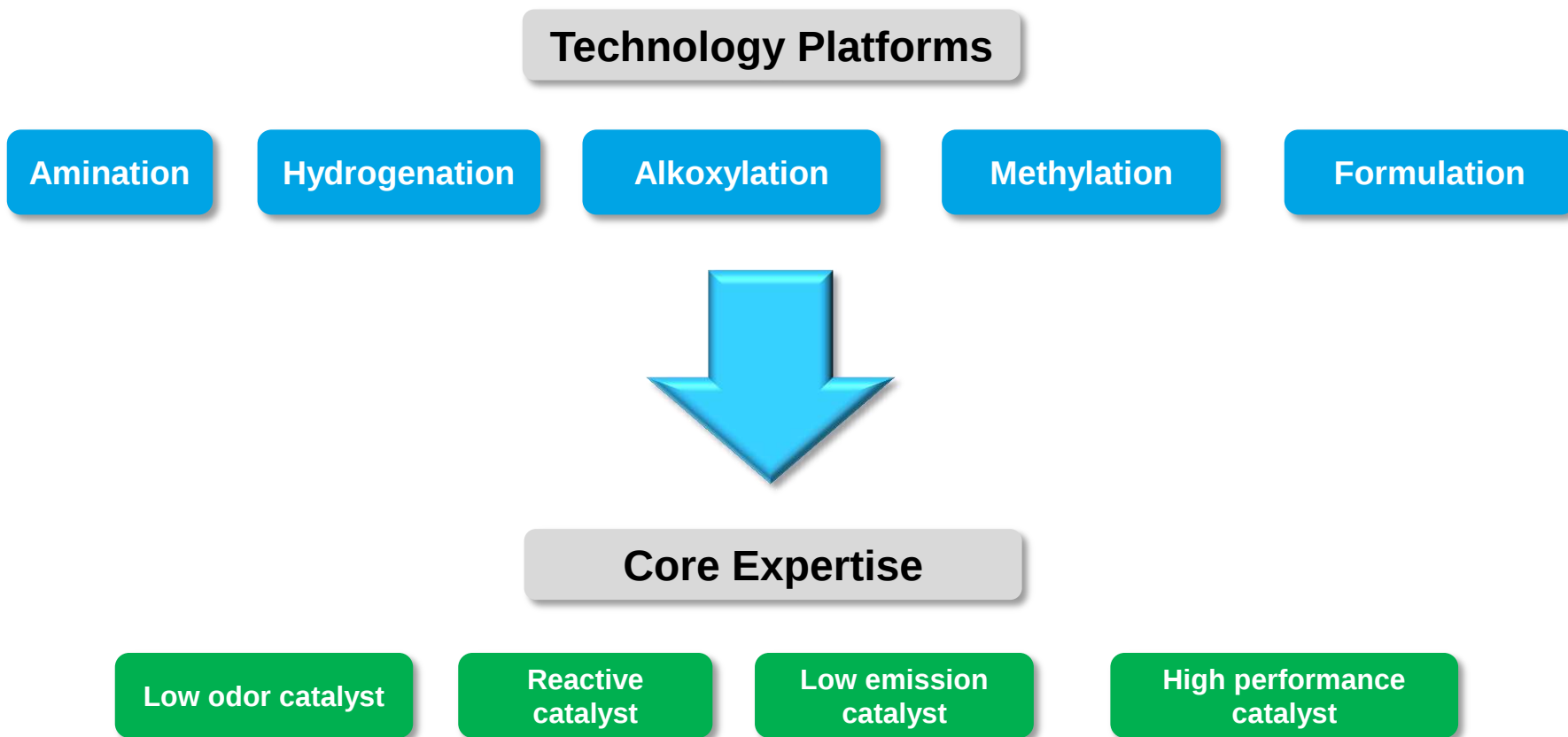
**MORE
COMFORTABLE**



**MORE
ENERGY SAVING**



Solvay Amine Core Technology for PU catalyst



Solvay catalysts

Traditional Purpose

Product name	Short name	Air product	Hunstman	Momentive	Status
Fentacat D89	DMEA	DMEA	DMEA	Niax DMEA	Commercial product
Fentacat BDMA	BDMA	BDMA	BDMA	Niax BDMA	Commercial product
Fentacat 8	DMCHA	Polycat® 8	DMCHA	Niax_C-8	Commercial product
Fentacat 5	PMDETA	Polycat® 5	PMDETA	Niax_C-5	Commercial product
Fentacat 41	DMAPA Triazine	Polycat 41	TR-90	Niax_C-41	Commercial product
Fentamine DMAPA	DMAPA		DMAPA		Commercial product
Fentacat M2		Dabco® TMR-2			Commercial product
Fentacat TMPDA	TMPDA	Dabco® TMPDA			Commercial product
Fentacat F1		Dabco® BL-11	ZF-22	Niax_A-1	Commercial product
Fentacat F99	BDMAEE	Dabco® BL-19	ZF-20	Niax_A-99	Commercial product
Fentacat F33		Dabco® 33LV		Niax_A-33	Commercial product

Solvay catalysts

SPECIAL CATALYSTS/LOW EMISSION CATALYSTS / REACTIVE CATALYSTS

Product name	Short name	Air product	Hunstman	Momentive	Commercialization plan
Fentacat 50*	PMDPTA	Polycat® 77	Jeffcat ZR-40		Commercial product
Fentacat 15	Bis DMAPA	Polycat® 15	Jeffcat Z-130		To be available
Fentacat 9*	Tris DMAPA	Polycat® 9	jeffcat ZR-80		To be available
Fentacat TMAEEA	TMAEEA	Dabco® T	Jeff cat ZF110		Commercial product
Fentacat 11			jeffcat DPA		Commercial product
Fentacat 10			jeffcat ZR-50		To be available
Fentacat DMAEE	DMAEE	DMAEE	ZR-70	Niax_DMEE	To be available
Fentacat 12			JJeffcat ZF-10		To be available

Note: Fentacat 50, Fentacat 9 are low odor but nonreactive type catalyst

Market and Application

Solvay	Markets	Application
FENTACAT 8	Rigid	FENTACAT 8 is a general purpose gelling catalyst; recommended for use in a broad range of rigid and semirigid foam. It shows excellent stability in polyol system.
FENTACAT 5	Rigid / Flexible	FENTACAT 5 has been widely used in polyurethane rigid foam and flexible foam. Fentacat 5 can help to achieve fine cell structure and improve K factor in cooperate with other additives in appliance system.
FENTACAT 41	Rigid PUR / PIR	FENTACAT 41 is a mild trimer catalyst used in a wide variety of rigid polyurethane and polyisocyanurate foam. It is recommended for use as a co-catalyst with other polyurethane and polyisocyanurate catalysts. Its controlled trimerisation activity results in a moderating effect on the overall reaction profile by helping to balance the formation of polyurethane and polyisocyanurate during polymerization.
FENTACAT BDMA	Rigid	FENTACAT BDMA is used in rigid foam applications. It can improve foam fragile in High-Water rigid foam formulations.
FENTACAT F1	Flexible/Rigid	FENTACAT F1 is 70% Fentacat F99 in dipropylene glycol solution. It is widely used in different forms, especially in high resilient foam, semi-rigid form and low-density foam.
FENTACAT F99	Flexible	FENTACAT F99 is a kind of amine catalyst with strong blowing capability. It is widely used in different forms, especially in high resilient foam, semi-rigid form and low-density foam.
FENTACAT F33	Flexible/Rigid	FENTACAT F33 is the most important high active gelling tertiary amine catalyst. It is widely used in different PU foams and PU CASE products.
FENTACAT M2	Rigid	FENTACAT M2 catalyst is a tertiary amine that promotes the polyisocyanurate reaction (trimerization). It provides a uniform and controlled rise profile compared to potassium based catalysts. FENTACAT M2 can also be used in flexible molded foam applications for back end cure.

Market and Application

Solvay	Markets	Application
FENTACAT 9	Low emissions. Elastomeric Shoe soles	FENTACAT 9 is a catalyst with low odor that provides a balanced promotion of the urethane and urea reactions in flexible and rigid foam applications. It can be used as a co-catalyst with strong blow and gel amine catalysts to balance the reaction as well as keep the rise profile smooth.
FENTACAT 15	Low emissions. Rigid / Flexible	FENTACAT 15 is a non-emissive balanced amine that has a slight selectivity towards the urea (isocyanate - water) reaction. Due to its reactive hydrogen, it can easily react in the polymer matrix. It improves the surface cure in flexible molded systems. It can be used in rigid polyurethane systems where a smooth reaction profile is required.
FENTACAT 50	Flexible - HR / Conventional	FENTACAT 50 is used in a number of flexible and rigid polyurethane foams. Major applications are automotive seating and headrests, polyether slabstocks, and rigid foams.
FENTACAT D89	Rigid / Flexible	FENTACAT D89 can be used solely as an effective catalyst in specific applications. It can also be used together with other catalysts of higher blowing or gelling activity.
FENTACAT DMAEE	Low Emissions. Flexible - Packaging	FENTACAT DMAEE is a low emission reactive catalyst. It can be used solely or in combination with FENTACAT F33.
FENTACAT TMAEEA	Low emissions. Rigid / Flexible	FENTACAT TMAEEA is a non-emissive reactive catalyst. It can be used in flexible and rigid foam to get a smooth blowing profile.
FENTACAT 10	Low emissions. Rigid / Flexible / Elastomeric	FENTACAT 10 is a non-emissive reactive catalyst. It has good gelation and flowability.
FENTACAT 11	Low emissions. Rigid / Flexible / Elastomeric	FENTACAT 11 is a non-emissive reactive catalyst. It is a balance catalyst which can be used in various applications.

Thank You

