BASF Catalysts

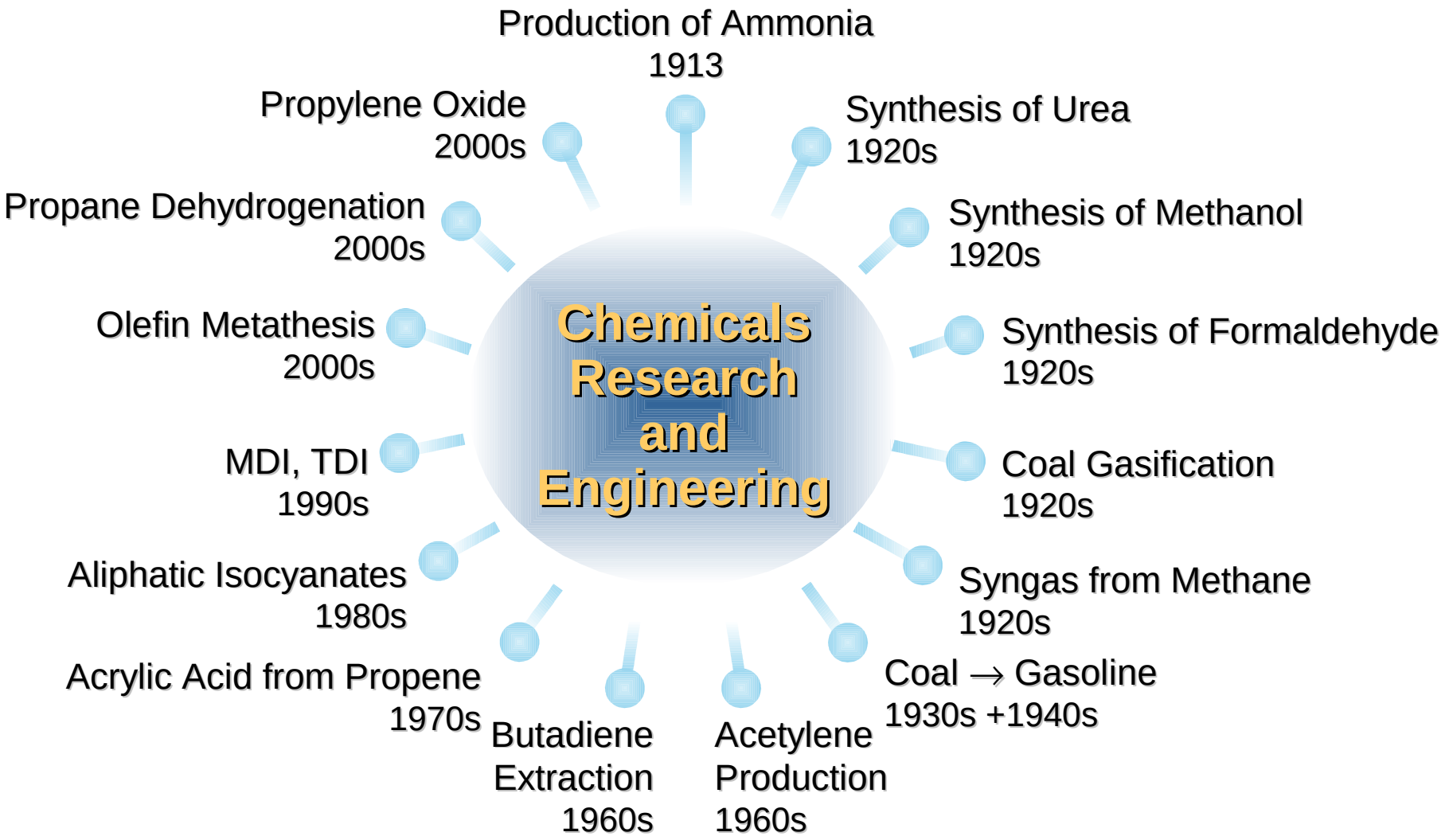
Yesterday, Today and Tomorrow

BASF
The Chemical Company

BASF Catalysts – Fact and Figures

- Largest catalyst company worldwide
- Only company covering all fields of catalysis
- Leader in catalysis R+D with 600+ scientists
- Pioneer in emission-control technologies
- Global leader in precious metals sourcing/supply
- 35 manufacturing sites around the world
- ~5,000 employees worldwide

History of Innovations



Catalyst Applications

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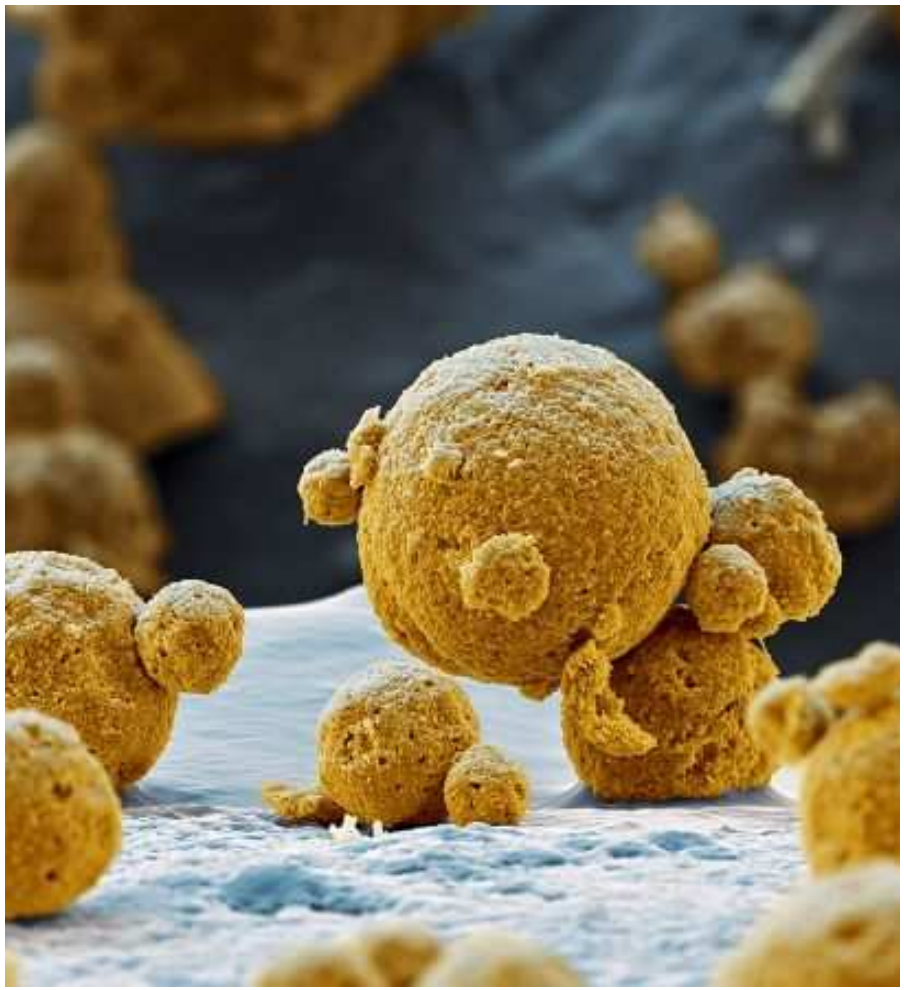
Refinery catalysts	Polyolefin catalysts	Chemical catalysts	Adsorbents
• Technology leader for catalysts and additives for fluidized bed catalytic cracking in oil refining	• One of the largest catalysts supplier for Polyethylene and Polypropylene	• Largest portfolio of petrochemical catalysts for entire chemical industry	• Leader in high-performance purification technologies for feed and product streams
			

Mobile and Stationary emission catalysts

Driving Innovations for the future



Innovation in five growth clusters:

- raw material change
- nanotechnology
- plant biotechnology
- white biotechnology
- energy management

Nitrous Oxide Reduction – The History

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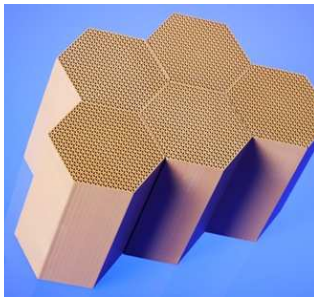
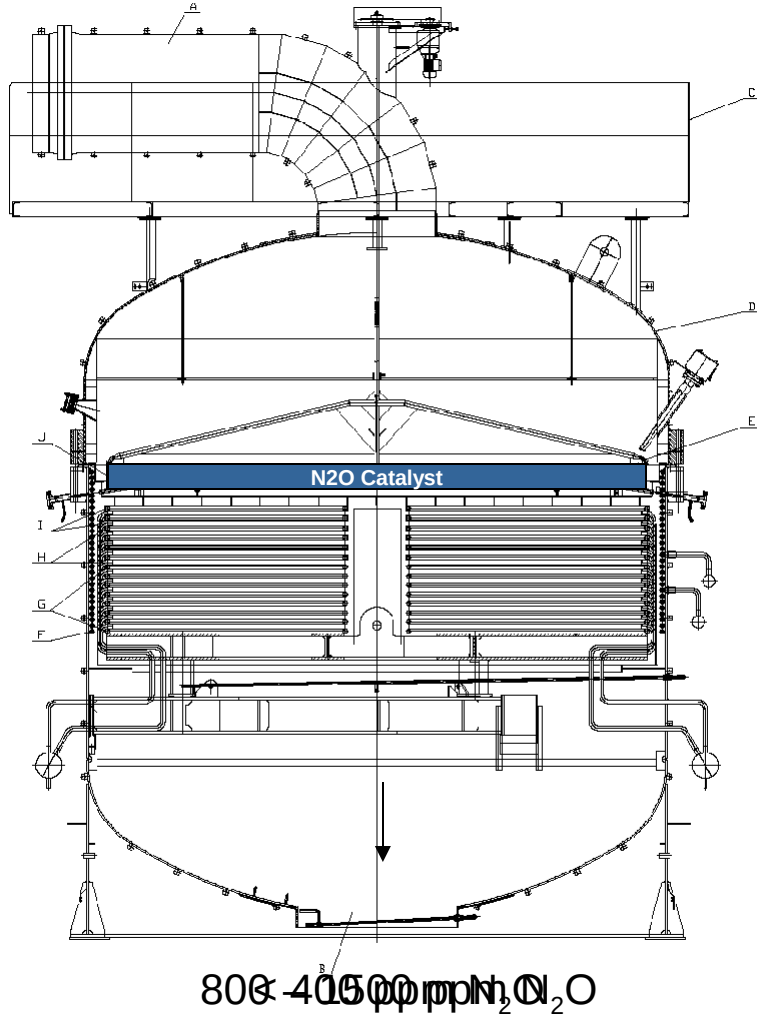
1960s	▪ Development of $DeNO_x$ catalyst for nitric acid plants.
1980s	▪ Development of $DeNO_x$ catalyst for various other applications including power plants.
1990s	▪ Development of N_2O catalyst to reduce N_2O emissions from adipic and nitric acid plants.
2009	▪ New development of N_2O honeycomb catalyst for reduction of N_2O emission.



How it works

NH_3 / Air Inlet



Description of principle

- $N_2O \rightarrow N_2 + ½ O_2$
- Drop in solution
- Installation directly below Pt-gauzes

Advantages

- No influence on NO_x yield
- Works with all Pt-gauzes
- Low investment cost

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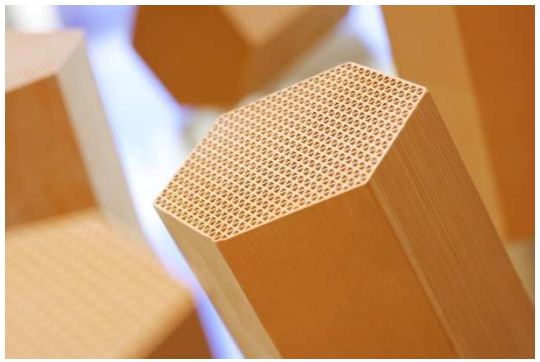
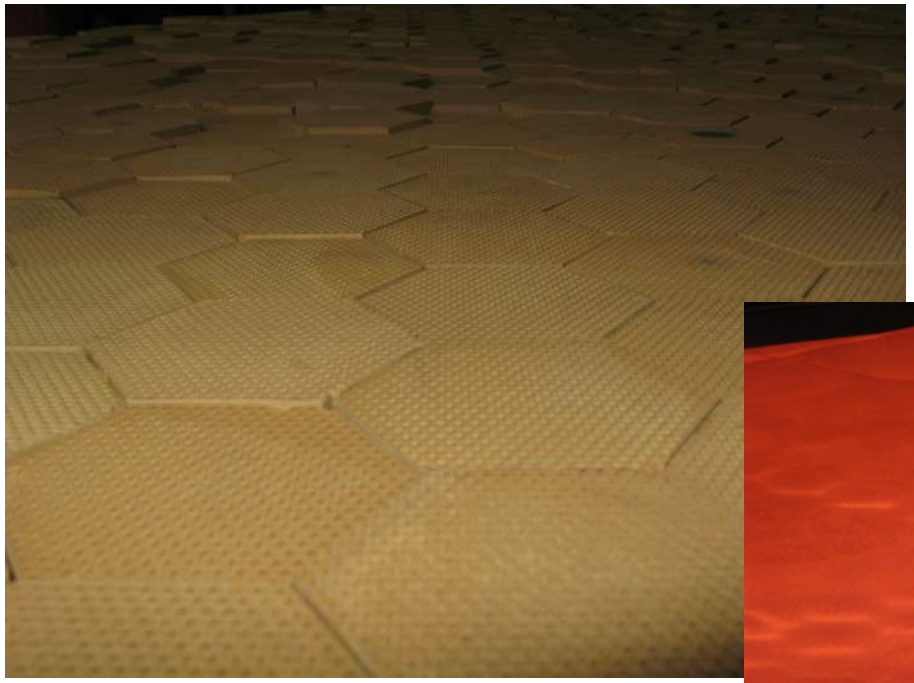
Key Advantages

- **Current Technology**
  - Satisfactory conversion and pressure drop in MP plants
  - Not applicable in HP-/LP plants due to pressure drop limitations
  - By-passes resulting from catalyst bed shift decrease conversion

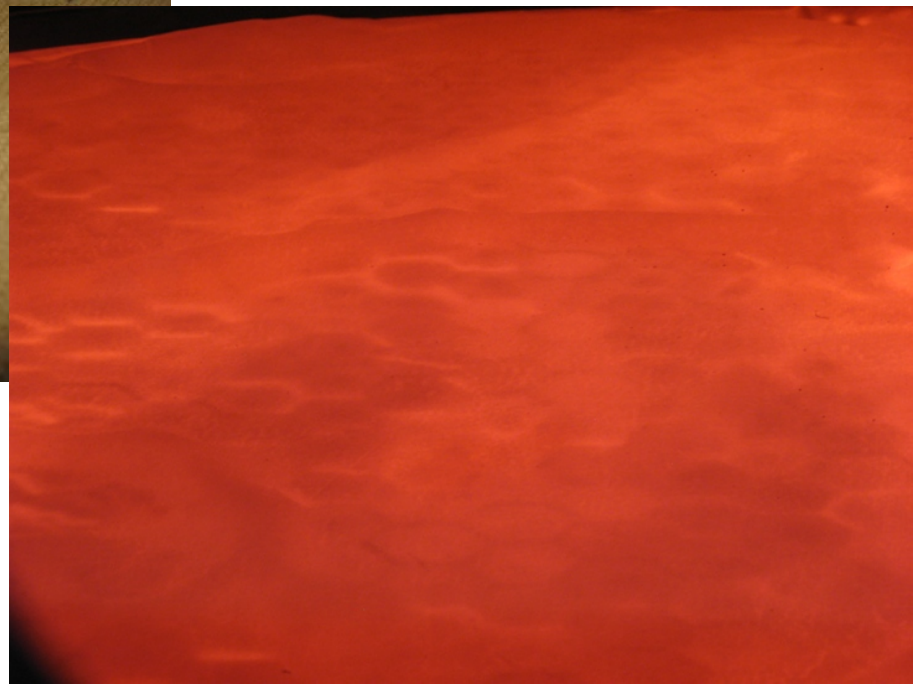
- **Innovative new Technology**
  - Conversion similar to current technology
  - Extremely low pressure drop allows application in HP-/LP plants
  - No conversion decrease through by-passes



Innovation in Operation



- Up to 900 deg C



Kyoto Project at ZA Pulawy

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2007
- ZA Pulawy and BASF sign cooperation agreement for greenhouse gas reduction.

2008
- Technical preparations.
  - Submission of documentation to Polish Authorities.
  - N_2O catalyst installed in first line.
  - Start of greenhouse gas reduction.

2009
- All lines equipped with N_2O catalyst.
- Greenhouse gas emission are reduced by more than 1,000,000 tons of CO_{2e} without undermining capacity and product quality.

BASF Catalysts –
We catalyze your process

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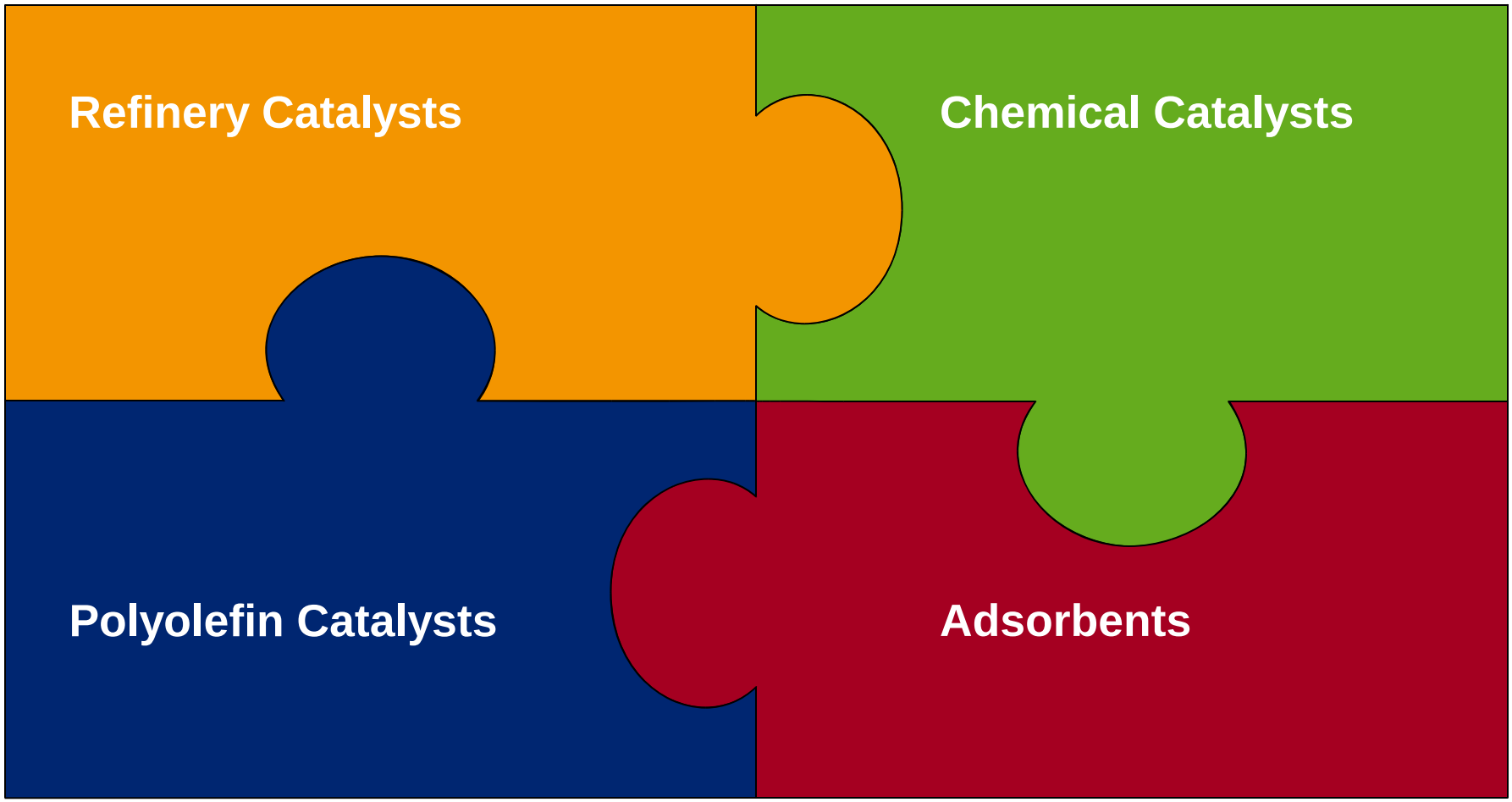

Back-up

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Adsorbents

- Activated Aluminas (Claus Catalysts, Chloride Trap, Desiccant)
- Activated Bentonites
- Sorbead® / KC-Trockenperlen® Adsorbents
- Puristar® Metal Oxide Based Products
- Selexsorb® Alumina Adsorbents
- Catalyst Intermediates & Tolling
- Mineral Adsorbents (Activated Clays)

Chemical Catalysts

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Chemical Synthesis

Oxidation & Dehydrogenation

Environmental & Syngas

Oleochemical

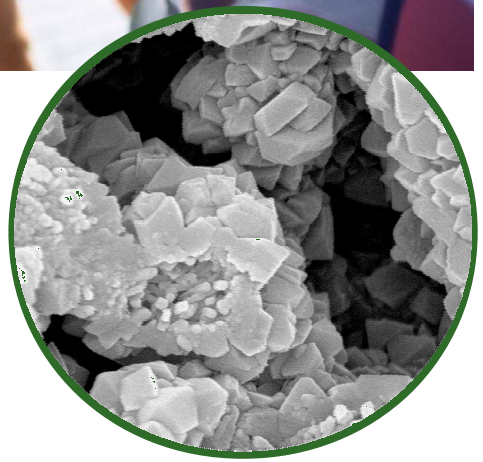
Fine Chemical & Pharmaceutical

Polyolefin Catalysts

- Largest independent polyolefin catalyst supplier in the world
- 100% focused on catalyst, with deep expertise in polypropylene
- Innovative manufacturer of custom and proprietary catalysts
- Committed to polyolefin catalysts since the 1980s
- Extensive expertise in customer plant operation and polymer design

Refining Catalysts

- **Providing ground-breaking oil refining technologies for over 50 years**
- **Proprietary Distributed Matrix Structure™ Fluid Catalytic Cracking (FCC) Technology allowing you to produce more of the products you want**
- **FCC Additives enabling cost effective environmental compliance and enhanced operating flexibility**
- **Distinct** FCC Solutions solving your individual needs



Proprietary Distributed Matrix Structure platform technology

Hydrogenations in Steamcracker
Extensive Portfolio