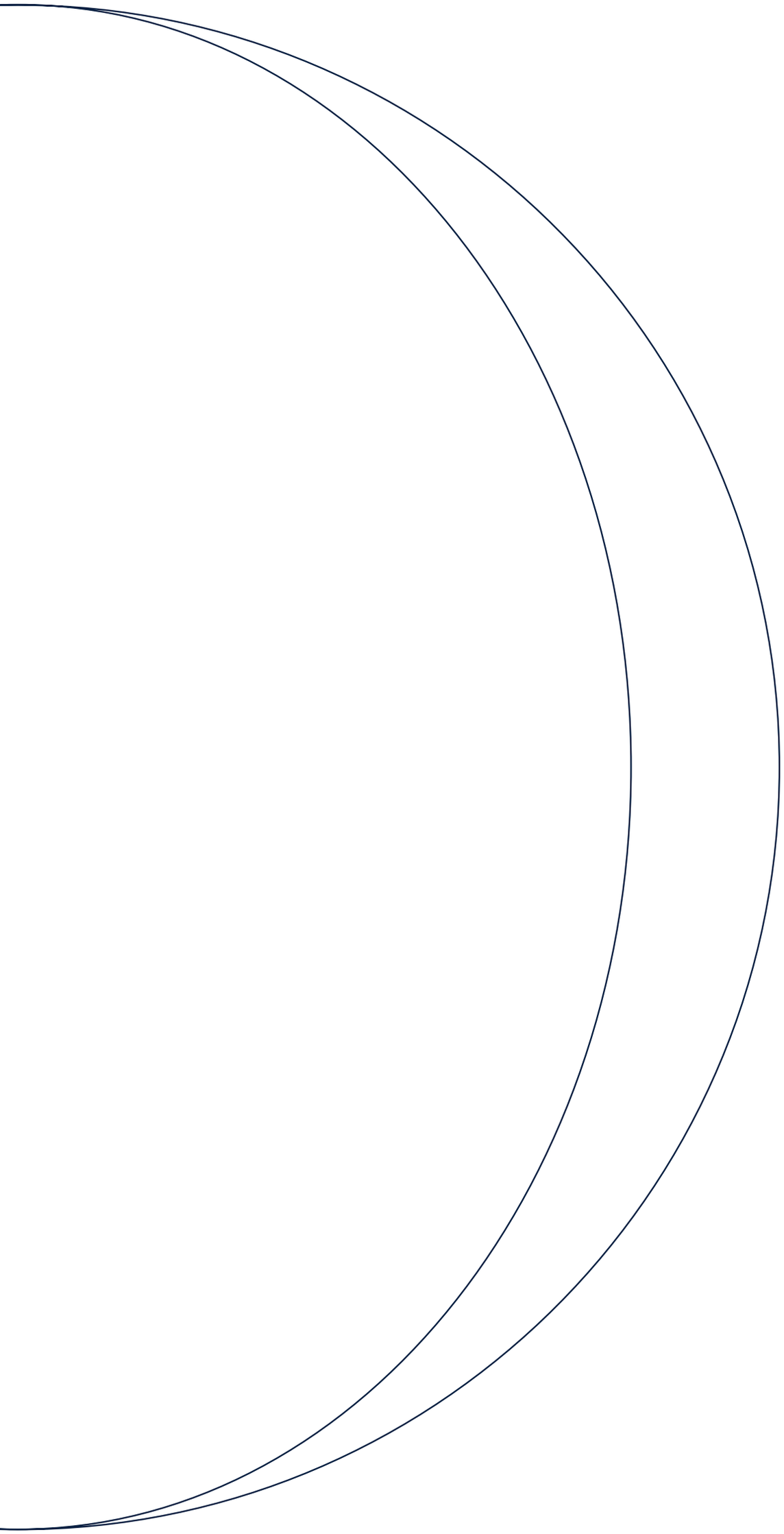
INEOS
Inovyn

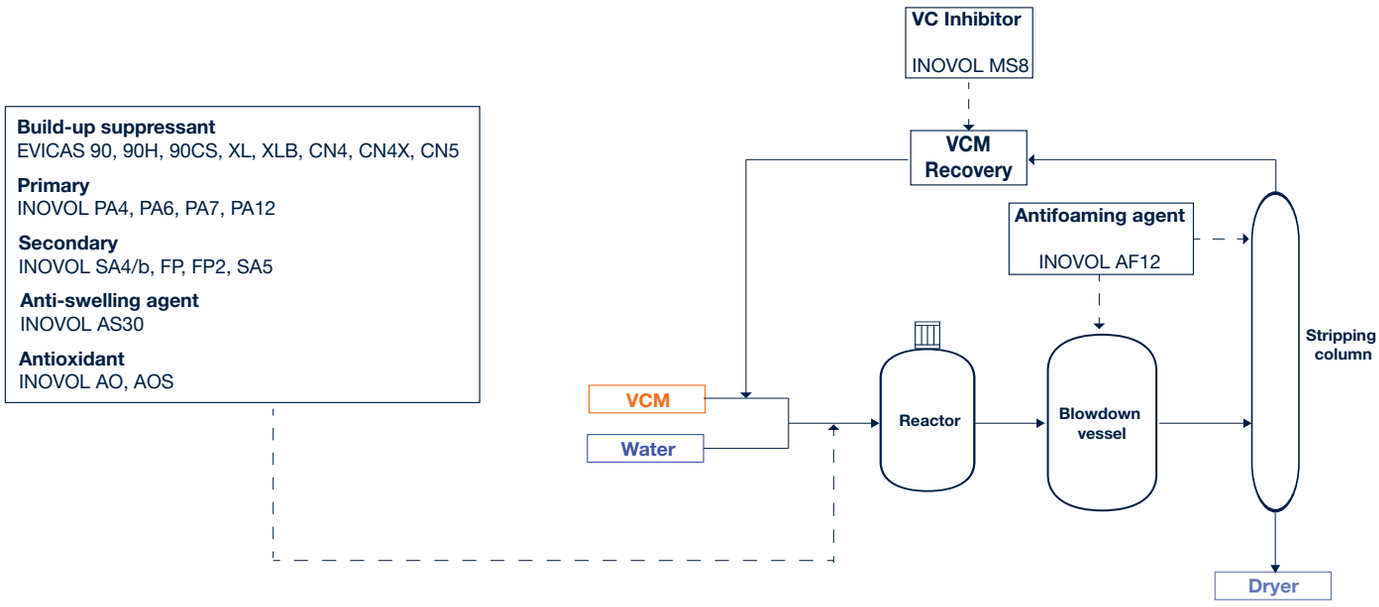
INEOS Performance Chemicals

PVC Additives
EDC Oxychlorination Catalysts



PVC Additives

INEOS Performance Chemicals' additives are designed to produce suspension PVC of the highest quality, giving robust particle size control, low foaming recipes and resin of excellent colour and homogeneous porosity for easy removal of VCM.



These products have been extensively evaluated and implemented on plants worldwide, which cover a broad range of different technologies, routinely producing many million tonnes of PVC each year. Customers can be assured that the products are of consistent quality and well proven.

Our PVC additives are designed to meet the demanding process requirements of high and efficient output, low cost and low environmental impact necessary in today's global PVC market.

PVC Additives

Antifouling agents

- EVICAS 90
- EVICAS 90H
- EVICAS 90CS
- EVICAS XL
- EVICAS XLB
- EVICAS CN4
- EVICAS CN4X
- EVICAS CN5

Primary suspending agents

- INOVOL PA4
- INOVOL PA6
- INOVOL PA7
- INOVOL PA12

Secondary suspending agents

- INOVOL SA4/b
- INOVOL FP
- INOVOL FP2
- INOVOL SA5

Antifoam, antiswelling, inhibitor, antioxidant

- INOVOL AF12
- INOVOL AS30
- INOVOL MS8
- INOVOL AO
- INOVOL AOS

The EVICAS range of antifouling agents

- Global market leader and multiple production units in USA and Europe
- Developed to prevent polymer build-up in reactors and condensers in PVC manufacturing processes and used continuously since 1981 on all reactor technology, from 20m^3 to 150m^3
- Plant Case Study: more than 2000 batches without the need for high pressure water cleaning.

EVICAS 90H | EVICAS 90CS | EVICAS XL | EVICAS XLB | EVICAS CN4 | EVICAS CN5

EVICAS 90H

- Original Build up suppressant that revolutionised the industry, continuously and successfully used since the 1980s
- Water based product, with a low freeze formulation option (EVICAS 90)
- Prevents polymer build-up in reactors, condensers and paste/emulsion manufacturing.

EVICAS 90CS

- Designed specifically to prevent build up in troublesome areas: agitator blades and shaft, internal baffles and condenser tubes.

EVICAS XL

- Second generation of the world famous EVICAS range
- Developed to adhere very strongly to reactor internals
- Can be used to optimise productivity.

EVICAS XLB

- Water based product, does not require nitrogen blanketing
- Developed for better spray application and improved adhesion to reactor internals
- Can leads to reduced consumption of antifouling agent.

EVICAS CN4

- Water based product, with a low freeze formulation option (EVICAS CN4X)
- Potential improvement in PVC powder colour of 20%
- Reduced dark specks due to improved application.

EVICAS CN5

- Water based product
- Improved resistance of material against oxidation
- Leads to better resin colour and reduced contaminations

The INOVOL range of suspending agents

Primary Suspending Agents

INOVOL PA4

- 80% Degree of Hydrolysis Primary Suspending Agent
- Optimised for demanding conditions such as high condenser heat removal, high monomer water ratio & direct steam injection.

INOVOL PA6

- 72% Degree of Hydrolysis Primary Suspending Agent
- Good size control under demanding conditions
- High cloud point for excellent hot water charge stability.

INOVOL PA7

- 88% Degree of Hydrolysis Primary Suspending Agent
- Provides colloidal stability to recipes
- Improves long term heat stability.

INOVOL PA12

- 73% Degree of Hydrolysis Primary Suspending Agent
- Improved size control in a wide number of recipes
- Improved Apparent Density with equivalent Porosity.

Secondary Suspending Agents

INOVOL SA4/b

- 55% Degree of Hydrolysis Secondary Suspending Agent
- Higher Apparent Density whilst maintaining equivalent or even lower residual VCM
- Improved porosity consistency.

INOVOL FP & INOVOL FP2

- New generation
- Non-PVA Based Secondary Suspending Agent, with non-flammable option (INOVOL FP2)
- Benefits: Improved homogeneity, low foaming, improved colour, reduced “fish-eyes”, improved VC/moisture loss.

INOVOL SA5

- 58% degree of hydrolysis Secondary Suspending Agent
- Contains uniquely ‘blocky’ distribution of functional OH groups
- Designed to yield superior internal homogeneity.

The INOVOL range of specialty products for PVC

ANTIFOAM - INOVOL AF12

- Reduces foaming and carry-over in the stripper column, reactor or downstream vessels
- Developed as an effective antifoam without adversely affecting the melt characteristics or volume resistivity of the PVC resin.

ANTISWELLING - INOVOL AS30

- Reduces or eliminates the swelling or foaming of the reactor's contents, allowing for increased fill and productivity
- Food approved.

VCM INHIBITOR - INOVOL MS8

- Developed to inhibit polymerisation in recovered monomer plant
- Food contact approved inhibitor
- Proven in sPVC and mass processes.

ANTIOXIDANT - INOVOL AO

- Water based, multipurpose formulation with improved storage stability
- Effectively stops polymerisation when injected before blowdown
- Improves initial colour and long-term heat stability of the final product.

ANTIOXIDANT - INOVOL AOS

- Water based, multipurpose stabiliser
- Effectively stops polymerisation and improves initial colour and long-term heat stability of the final product
- Designed specifically to reduce build up in spiral heat exchangers.

EDC Oxychlorination Catalysts and Diluents

Fixed bed catalysts

- IVOC - P1DT
- IVOC - P2T
- IVOC - P2D
- IVOC - P3T
- IVOC - P3P

Fixed bed diluents

- IVOD - 1
- IVOD - 2F

Fluid bed catalysts

- IVOC - FB1
- IVOC - FB4*
- IVOC - FB6
- IVOC - FB7
- GM5824

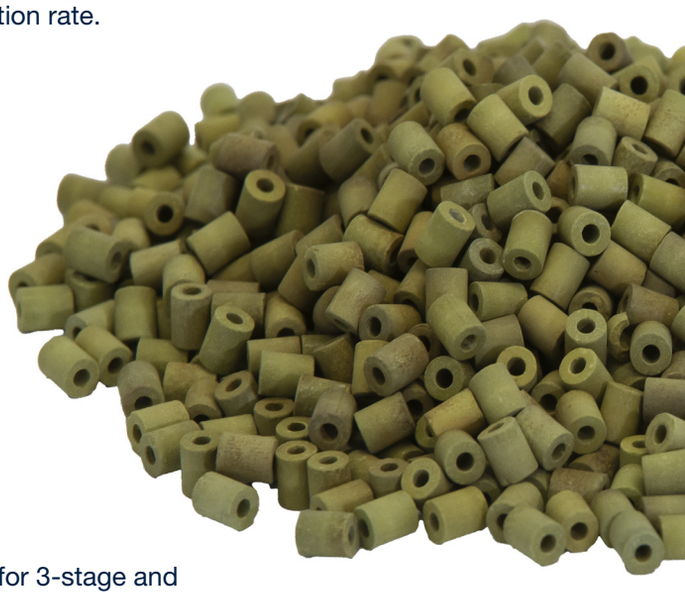
The IVOC range of fixed bed oxychlorination catalysts

The IVOC-P type catalysts are a series of well-proven promoted copper catalysts on alumina support. They are suited for Ethylene Oxychlorination in fixed bed reactors operating with air or oxygen, in the INEOS' signature 2-stage and 3-stage technologies applied world-wide since 1998.

Catalysts

IVOC - P1DT

- FIRST Reactor Catalysts for 3-stage and 2-stage plants
- Low pressure drop, longer pressure drop stability, low deactivation rate.



IVOC - P2D

- First reactor bottom zone Catalyst for 3-stage and 2-stage plants
- New catalyst development, industrially used since 2020
- Improved stability and performance, with minimised fouling
- Allows longer life of First reactor.

IVOC - P2T

- First reactor bottom zone Catalyst and Second Reactor top zone Catalysts for 3-stage and 2-stage plants
- Low pressure drop, high activity, low deactivation rate.

IVOC - P3T

- Full Third Reactor and Second Reactor bottom zones Catalyst for 3-stage and 2-stage plants
- High activity to achieve best conversions
- High Selectivity to 1,2-EDC, low combustion and high HCl conversion (low acidity).

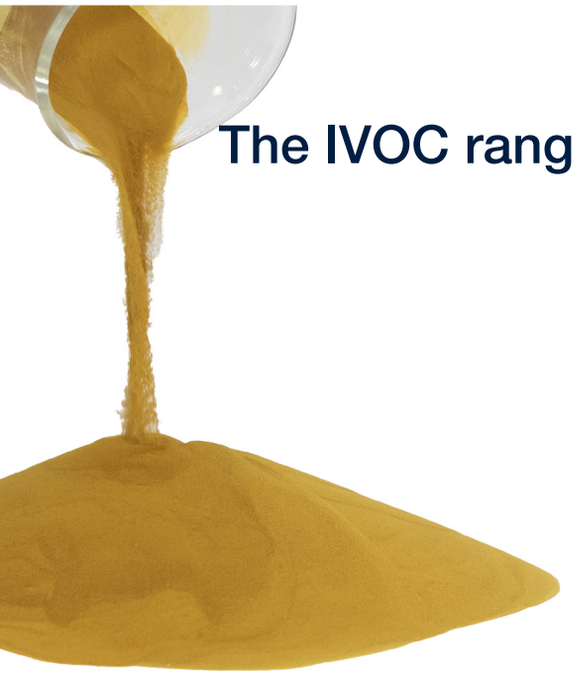
IVOC - P3P

- Catalyst for End of reaction: Full Third Reactor and Second Reactor bottom zones Catalyst for 3-stage and 2-stage plants
- New catalyst formulation, efficiently in use since 2021
- To be used alone or in combination with P3T in 3-stage plants
- Efficient and stable performances, with low combustion and high HCl conversion (low acidity).

Diluents

IVOD - 1
IVOD - 2F

- High performance graphite-based diluents for exothermal reactions
- High thermal stability and high purity material. Optimised shape for low pressure drop. The special shape of the 2F series allows the plant to achieve very high capacity at the lowest pressure drop.



The IVOC range of fluid bed oxychlorination catalysts

The IVOC-FB type catalysts were developed since 1996 and are the Inovyn series of promoted copper catalysts supported on alumina. They have been specifically developed for the Ethylene Oxychlorination process in fluid bed Reactors operating with air, enriched air or oxygen.

The IVOC-FB range of catalysts operate in the normal range of fluid bed processes (from 200 to 260°C) and offer an excellent fluid-dynamic behaviour even at severe conditions. They have proved to be applicable in OxyVinyls, Vinnolit and Kem One technologies.

IVOC - FB1

- Since 1998, HIGH temperature catalyst operating at 235-255°C
- High selectivity to 1,2-EDC, low combustion and stable reaction performance.

IVOC - FB4*

- HIGH performance catalyst operating at 220-260°C
- Widely applied, in different technologies, since 2006
- Optimal performance, with high Ethylene and HCl conversions, low combustion and high yield to 1,2-EDC Reaches overall high Activity and high Selectivity
- No tendency to Sticking phenomenon
- The correct use allows to increase the production rate.

IVOC - FB6

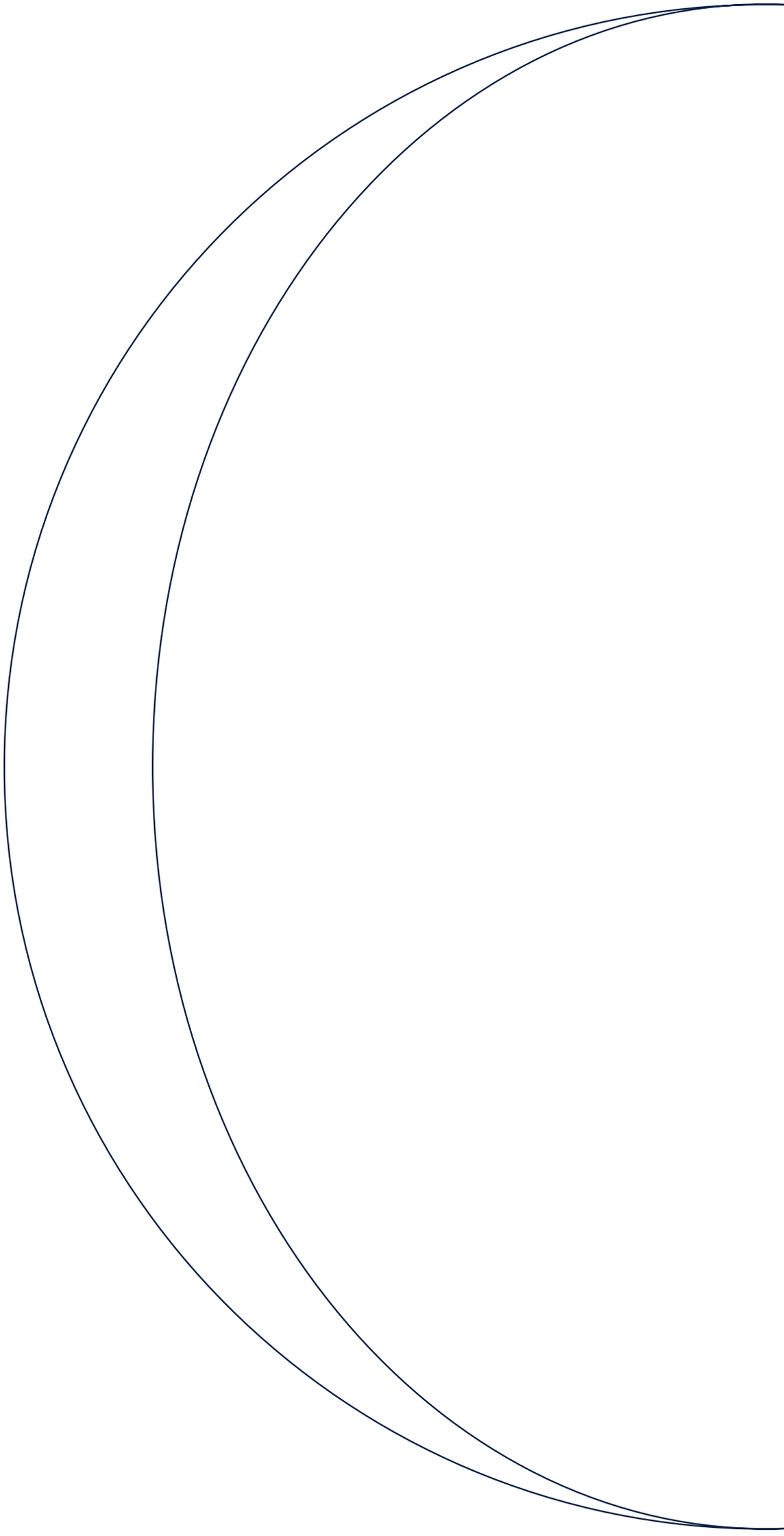
- **NEW** - HIGH performance catalyst operating above 220°C.
- Improved Conversions and Selectivity thanks to modified alumina support, additives and composition
- Designed for Oxyvinyls and Vinnolit reactors, it can replace or can be added to IVOC-FB4* or to competitor catalysts.
- Very good performance for high-capacity Reactors.

IVOC - FB7

- Specially formulated catalyst to improve, boost or recover the performance of the reactor.

GM5824

- Heritage HIGH temperature catalyst operating above 245°C in Oxygen-based Solvay processes
- High selectivity to EDC is achieved at high productivity.



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