VINYLS TECHNOLOGIES

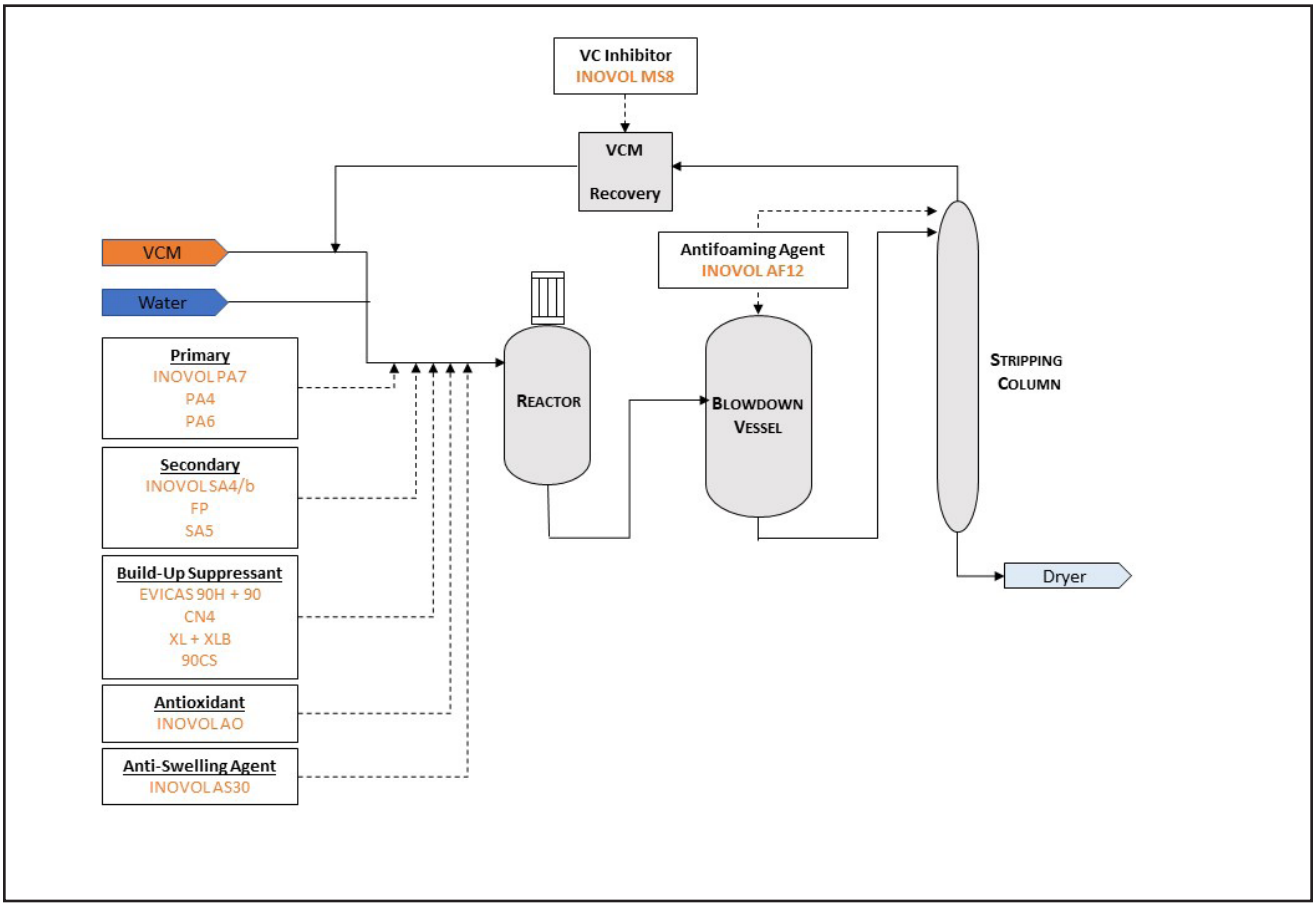
PVC ADDITIVES
EDC OXYCHLORINATION CATALYSTS

inovyn
An INEOS company

VINYLS PVC ADDITIVES

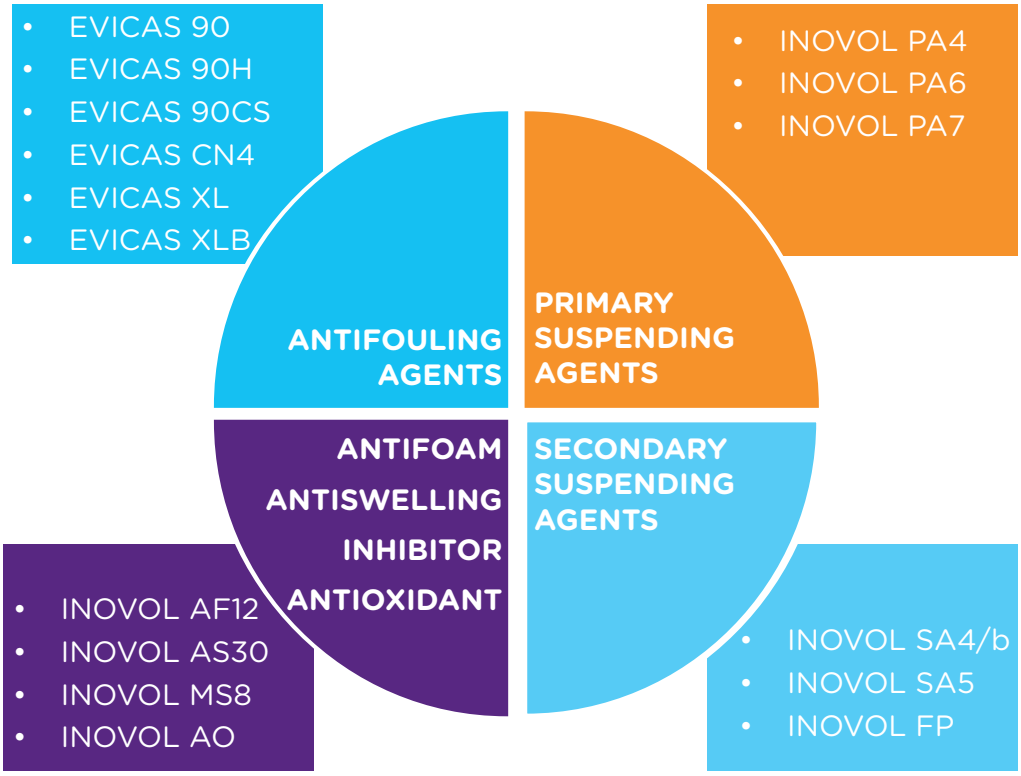
PVC ADDITIVES

INOVYN's Vinyls Technologies 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.



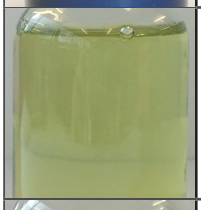
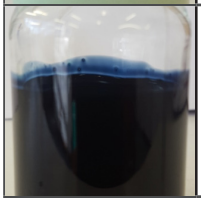
These products have been extensively evaluated and implemented on plants worldwide, which cover a broad range of different technologies, routinely producing several million tonnes of PVC each year. Customers can be assured that the products are of consistent quality and well proven.

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.



THE EVICAS RANGE OF ANTIFOULING AGENTS

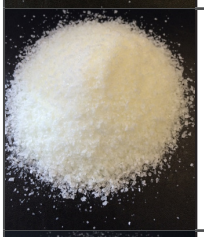
- Global market leader and multiple production units in USA and Europe
- Developed to prevent polymer build-up in reactors and condensers in PVC manufacturing processes and used continuously since 1981 on all reactor technology, from 20m^3 to 150m^3
- Plant Case Study: In excess of 2000 batches without the need for high pressure water cleaning
- Portable EVICAS application rigs are available to support industrial plant trials.

	EVICAS 90H • Water based product, proven since early 1980s • Prevents polymer build-up in reactors, condensers and paste/emulsion manufacturing
	EVICAS XLB • Water based product, does not require nitrogen blanketing • Developed for better spray application and improved adhesion to reactor internals • Leads to reduced consumption of antifouling agent
	EVICAS CN4 • Water based product • Potential improvement in PVC powder colour of 20% • Reduced dark specks due to improved application
	EVICAS XL • Newest generation of the world famous EVICAS range • Developed to adhere very strongly to reactor internals • Eliminates the need to apply antifouling agent every batch
	EVICAS 90CS • Designed specifically to prevent build up in troublesome areas: agitator blades and shaft, internal baffles and condenser tubes.

THE INOVOL RANGE OF 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

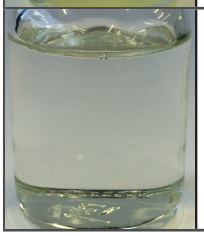
- 88% Degree of Hydrolysis Primary Suspending Agent
- Provides colloidal stability to recipes
- Improves long term heat stability

INOVOL SA4/b

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

INOVOL SA5

- 57-60% Degree of Hydrolysis Secondary Suspending Agent
- Improved internal homogeneity and particle size distribution leads to better VCM “strippability”



INOVOL FP

- NEW GENERATION
- Non-PVA Based Secondary Suspending Agent
- Benefits: Improved homogeneity, low foaming, improved colour, reduced “fish-eyes”, improved VC/moisture loss.

THE INOVOL RANGE OF SPECIALTY PRODUCTS FOR PVC

INOVOL AF12: ANTIFOAM

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

INOVOL AS30: ANTISWELLING

- Reduces or eliminates the swelling or foaming of the reactors contents, allowing for increased fill and productivity
- Food approved

INOVOL MS8: VCM INHIBITOR

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

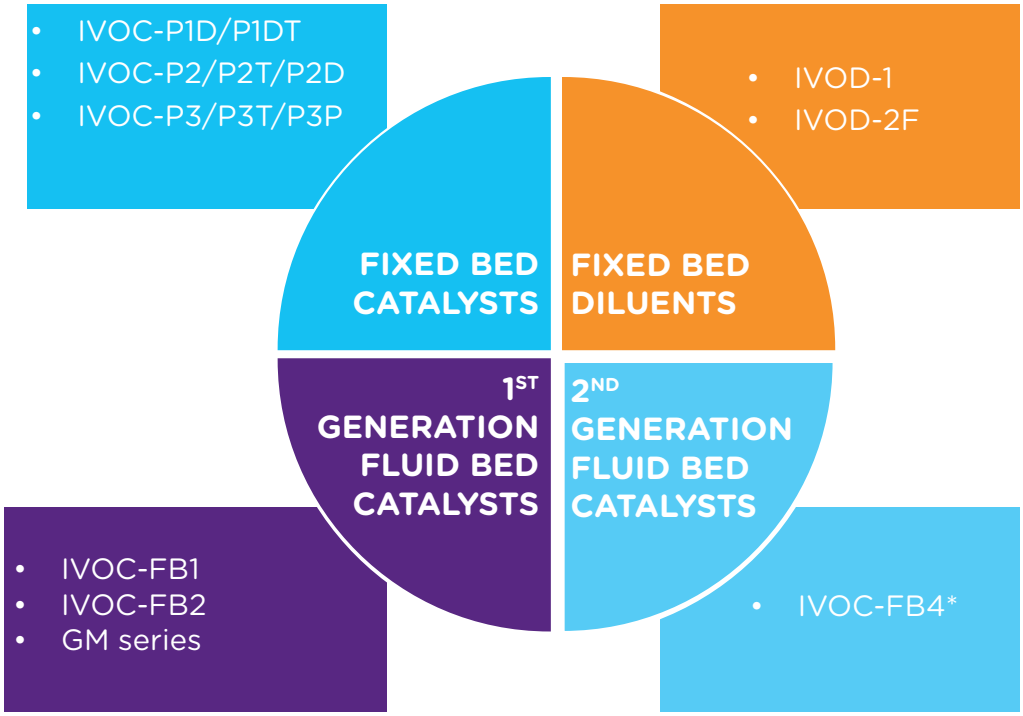
INOVOL AO: ANTIOXIDANT

- Water based, multipurpose formulation with improved storage stability
- Effectively stops polymerization whilst ensuring good colour and thermal stability
- Leads to excellent brightness of the PVC resin

Production trials are supported by our Research, Development and Technical Service teams in the UK, Belgium and Italy, which have been at the forefront of many of the technical innovations developed over the past 70+ years.

We offer a wide range of services to our PVC additive customers.

VINYLS OXYCHLORINATION CATALYSTS



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 single, three and the newest two stage technology offered by our licensing department.

CATALYST

IVOC-P1D and IVOC-P1DT

- FIRST Reactor Catalysts for 3-stage and 2-stage (T series) plants
- Low pressure drop, high pressure drop stability, low deactivation rate

IVOC-P2 and IVOC-P2T and IVOC-P2D

- FIRST & SECOND Reactor Catalysts for 3-stage and 2-stage (T series) plants
- Low pressure drop, high activity, low deactivation rate

IVOC-P3 and IVOC-P3T and IVOC-P3P

- SECOND & THIRD Reactor Catalysts for 3-stage and 2-stage (T series) plants
- High Selectivity to 1,2-EDC, low combustion, high HCl conversion (low acidity)

DILUENTS

IVOD-1 and IVOD-2F

- High performance graphite based diluents for exothermal reactions (Oxychlorination)
- 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 presure drop.

THE IVOC RANGE OF FLUID BED OXYCHLORINATION CATALYSTS

- The **IVOC-FB** are a 1st Generation series of promoted copper catalysts on alumina support. Ideally suited for Ethylene Oxychlorination in fluid bed reactors operating with air or oxygen and are applicable to Oxychlorination technologies licensed by OxyVinyls, Vinnolit and Arkema.

- Their specific composition assures as main advantages: high selectivity to EDC, high activities and stable Oxychlorination reaction in the whole range of operating conditions. Proven in different technologies since 1999, they can operate in the whole range of temperature typical of fluid bed processes (from 200° to 250°C).

- The **IVOC-FB4*** represents the 2nd Generation of fluid bed catalyst which provides an improved efficiency and a higher stability at the different operating conditions. At standard capacity, a saving ethylene of and caustic can be achieved due to very high reactant conversions. The higher activity can also allow an increase of the production rate. It can operate in the normal range of fluid bed processes (from 220 to 260°C) and offer an excellent fluid-dynamic behavior even at severe conditions. FB4* has been proven in the different Oxychlorination technologies since 2006.

- The **GM** are series of promoted copper catalysts on alumina support. The **GM5824** is ideally suited for Ethylene Oxychlorination in fluid bed reactors operating with oxygen and are specifically designed for technologies operating with reactor temperatures above 245°C (**in particular Solvay heritage technology**). Their specific compositions are tailor-made to achieve high EDC productivity at elevated temperature conditions while ensuring high selectivity to EDC, high activities and stable Oxychlorination reaction. The very high reactant conversion allows for a saving in ethylene and caustic

IVOC-FB2

- 1st Generation LOW temperature catalyst
- Operating temperature 210-230°C in air and oxygen based processes

IVOC-FB1

- 1st Generation HIGH temperature catalyst
- Operating temperature 235-255°C in air and oxygen based processes

IVOC-FB4*

- 2nd Generation high performance catalyst
- Operating temperature 220-260°C in air and oxygen based processes.

GM series

- Heritage generation of HIGH temperature catalysts
- Operating temperature above 245°C in oxygen based processes

INEOS Vinyls Belgium SA/NV
Avenue des Olympiades 20 / Olympiadenlaan 20
1140 Brussels
Belgium

Email: pctorders@ineos.com

www.inovyn.com/products/technologies

V1/2019