



# Chelates Product Guide





## Dissolvine® chelates

The versatile solution  
to metal ion control

Metal ions have a powerful influence on chemical processes as well as on the performance of many products. A wide range of problems associated with metal ions can be solved using Dissolvine® chelates; from improving the efficiency of pulp bleaching to cleaning dairies, from increasing crop quality and yields to preserving food quality.

For details and contact information please check our websites:

[www.dissolvine.com](http://www.dissolvine.com)  
[chelates.nouryon.com](http://chelates.nouryon.com)  
[micronutrients.nouryon.com](http://micronutrients.nouryon.com)

## How do Dissolvine® chelates work?

Dissolvine® is the Nouryon brand name for products known as chelates, chemicals that control the reactivity of metal ions.

As the word 'chele' implies (it's Greek for crab's claw), chelates seize a metal ion and control it, making it very difficult for another substance to liberate it. Dissolvine® chelates form strong, water-soluble complexes that prevent undesirable precipitation, dissolve scale deposits and optimize oxidation processes. Our Dissolvine® chelate product range includes chelating agents that bind and control metal ions, as well as metal chelates that introduce the right form of metal ions into a product or process.

The hard water metal cations calcium and magnesium, but also metals like iron or barium can form low water-soluble salts with hydroxides, carbonates, sulfates and phosphates that precipitate out of aqueous systems. These precipitates form scales that are extremely difficult to remove and reduce the efficiency of boilers and chemical processing equipment. When Dissolvine® chelating agents are added to these systems, they complex the metal ions into a water-soluble form and dissolve the scale deposit so that it is removed in the cleaning process.

# Where can Dissolvine® chelates make a difference?

In virtually any industrial process which uses water, Dissolvine® chelates can add or remove metals ions or alter metal ions properties in a controlled way.

## Removing unwanted metal ions / alter properties

In many applications chelates are used to remove or alter the properties of metals that are detrimental to the process, for instance, reducing water hardness or removing scales. Examples include:

### Preventing precipitation, removing scale, dirt or dissolving metal ions

- cleaners and detergents
- industrial cleaning / descaling
- textile processing
- agricultural applications
- mining processes
- oil and gas production / processing
- electronics
- metal plating
- photography

### Controlling metal catalyzed reactions

- building applications
- food and feed products
- personal care products
- polymer production
- pulp and paper production

## Reducing the toxic effects of metals

- fish hatchery processes
- pharmaceutical products

## Introducing metal ions

At other times you may want to introduce metal ions into an application in just the right 'form'. For instance:

## Oxidizing or reducing agent

- H<sub>2</sub>S gas sweetening
- photography

## Transforming trace metals into water soluble complexes

- agriculture
- food fortification

Wherever you use a Dissolvine® chelate, it can significantly improve the efficiency and cost effectiveness of your process.

# Dissolvine® chelates

## For every application

The Dissolvine® chelates product line is the most extensive there is, with chelates available for many industrial processes. The primary applications are described below, but please contact our representatives for more information related to your specific needs.

## Agriculture

Every crop needs several kinds of nutrients. Dissolvine® chelates act as carriers for micronutrients, ensuring that plants get the trace elements they need, regardless of environmental conditions. It ensures a undisturbed plant uptake of essential micronutrients and therefore helps to achieve a maximum productivity of the crop, resulting in an efficient land and water use. Products can be applied on or in the soil or can be sprayed onto plants, alone or in combinations with water-soluble NPK fertilizers. High-purity metal chelates are available to meet the rigorous demands of soil-less culture (hydroponics). Chelated micronutrients can be used to avoid

precipitations in hard water in order to prevent losses of valuable micronutrients and also to prevent scale in drip irrigation. They can be applied in combination with most pesticides. See: [micronutrients.nouryon.com](http://micronutrients.nouryon.com)

## Building and Construction

Rapid setting of Portland cement and gypsum can be a problem. For example, in modern gypsum board mills the proper balance of multiple admixtures is essential for optimal operation. Dissolvine® chelates are applied as efficient retarding agents without influence on the final strength. This gives these building materials an extended use time and self leveling properties.





### Cleaning and detergents

Dissolvine® chelating agents are powerful builders. They enhance the cleaning power of a cleaner/ detergent by catching the hard water ions (Ca and Mg) and removing Ca and Mg based residues which bind most dirt to surfaces. They also prevent the deactivation of anionic surfactants from hard water metal ions, so less surfactant can be used. Besides this, Dissolvine® chelating agents deactivate the unwanted transition metal ions that are often introduced through raw materials in the manufacture of soap and of detergents that contain peroxides like hydrogenperoxide, percarbonates and perborates. In biocidal detergents chelates greatly enhances the effectiveness of biocides so the amount needed to be effective can be reduced. They also boost the performance of preservatives in liquid detergents, again less can be used and cost savings can be made.

### Industrial Cleaning

Metal salts can cause scaling problems in boilers, heat exchangers and other water circulation systems found in the power, brewing, sugar and dairy industries. Dissolvine® chelating agents form stable, water-soluble metal complexes with all potentially harmful metal ions, dissolving existing scale formations and preventing new scales from forming.

### Feed additives

Trace metal elements are important for the health and growth of animals. According to US law, disodium EDTA (Dissolvine® NA2-P) can be used to solubilize trace minerals in aqueous

solutions, which are then added to animal feeds (US: 21CFR, sec 573.360). Dissolvine® chelates are also used as preservatives in animal feed.

### Food fortification

Iron is an essential element for good health. Ferrazone® (food-grade sodium iron EDTA), is a highly effective iron source in food fortification to combat iron deficiency anemia and is produced in compliance with FSSC 22000 regulations. Sodium iron EDTA is recommended by the World Health Organization as the preferred iron fortificant for wheat and maize flour. Furthermore Ferrazone® can be used in drinks fully free of any metallic taste and has been accepted for food use in nearly all countries worldwide. Please contact us for the current regulatory status of Ferrazone®. See: [www.ferrazone.com](http://www.ferrazone.com)

### Food preservation

The reaction of traces of heavy metals ions with organic and inorganic components in food and beverages can cause discoloration, texture change and turbidity. Trace metals also catalyze the oxidation of vegetable oils and fat, causing rancidity. To prevent against these unwanted reactions in food products, Dissolvine® chelates, Solvitar (Calcium EDTA) and Dissolvine Na2-P (Disodium EDTA) deactivate these undesirable metal ions. Thereby they preserve the quality and increase the shelf life of food and beverages. Both Dissolvine® products are produced in compliance with FSSC 22000 regulations. See: [www.solvitar.com](http://www.solvitar.com)

### Gas sweetening

In commercially available processes, ferric ions oxidize H<sub>2</sub>S to elemental sulfur. Dissolvine® chelating agents activate the ferric ions and prevent them from precipitating.

### Metal plating and electronics

Solutions containing copper ions are used in the production of printed circuit boards. Copper and nickel are used in plating of automotive parts. Dissolvine® chelates fulfill several functions: as a metal carrier, as a stabilizer of process baths and for neutralizing trace impurities.

### Oil industry

Dissolvine® and Stimwell™ chelating agents are widely used in various oilfield applications like completion, stimulation, pickling and scale removal to dissolve unwanted precipitation such as SrSO<sub>4</sub>, BaSO<sub>4</sub> and CaCO<sub>3</sub> and iron scales. Furthermore, they can prevent iron precipitation during acidizing and fracturing processes. See: [stimwell.com](http://stimwell.com)

### Personal care

Transition metal ions can catalyze the degradation of ingredients used in personal care products. Dissolvine® chelating agents inactivate the undesirable metal ions, maintaining quality and improving shelf life. Dissolvine® chelates also boost the performance of preservatives in liquid personal care products, lowering cost and toxicity and enhancing the public acceptance of the products.

### Pharma

Some of our products are qualified for use in the production of pharmaceuticals. Please check with our representatives for specific details.

### Photography

Chelated ferric ions are used to oxidize metallic silver into soluble silver ions, which can then be washed from films. Dissolvine® chelating agents act as carriers of these ferric ions and play an essential role in accelerating and fine-tuning the reactivity of these ferric ions with metallic silver.

### Polymer production

Ferric (Fe<sup>3+</sup>) and ferrous (Fe<sup>2+</sup>) ions play a key role in initiating emulsion polymerization processes to produce SBR and ABS. Dissolvine® chelating agents act as carriers of ferric ions. They also conserve natural rubber lattices by deactivating metal ion impurities that can catalyze decomposition.

### Printing ink

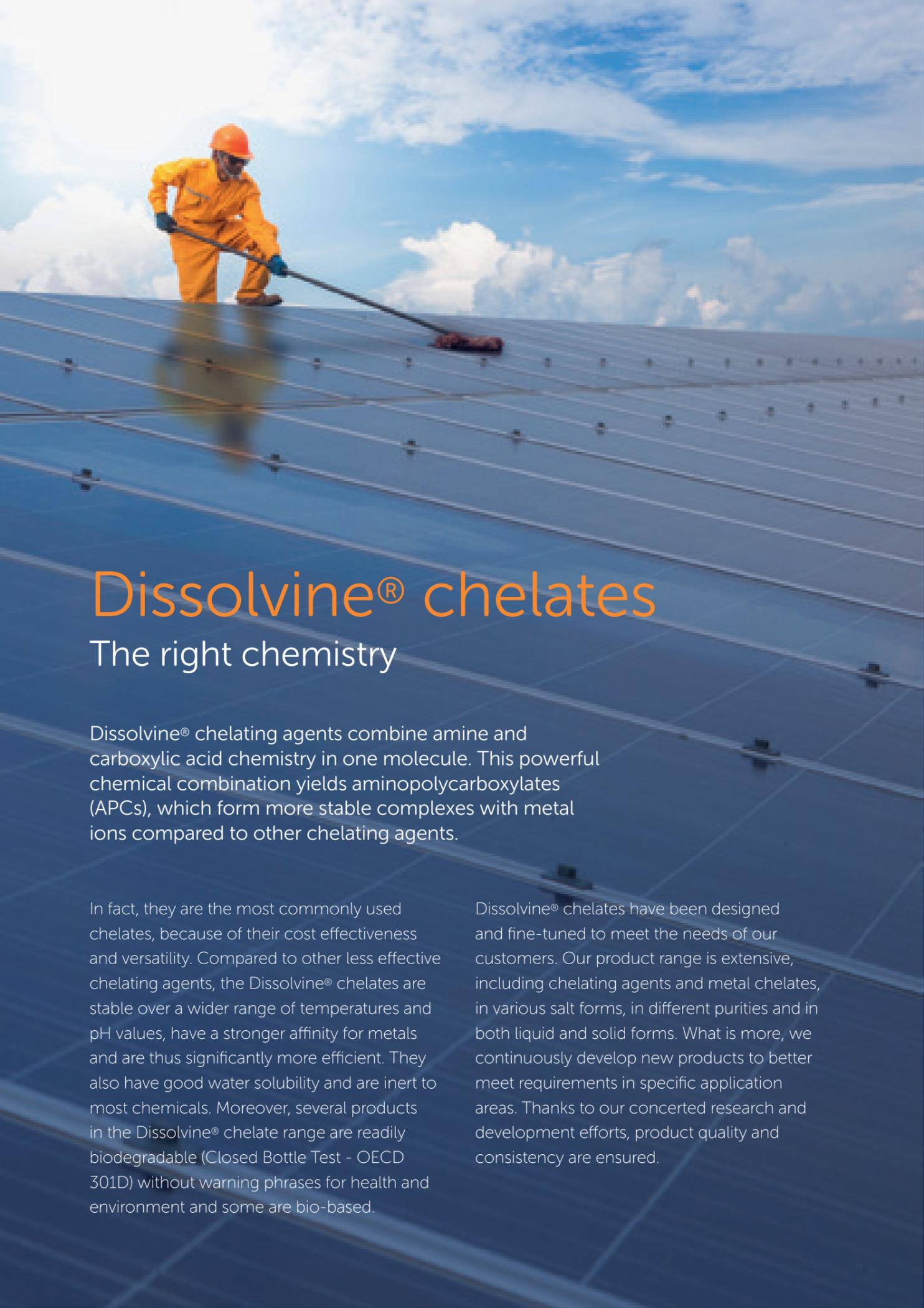
Metal ions can cause the formation of insoluble resin soaps in water thinned inks. For example, in offset printing, the formation of polyvalent metal soaps may cause unwanted discoloration. Dissolvine® chelating agents are used to overcome these problems, resulting in clear and color-stable inks.

### Pulp and paper

Some transition metal ions catalyze the decomposition of bleaching agents (e.g. peroxide, ozone and hydrosulfite) and can lead to brightness reversion of pulp and paper. Dissolvine® chelating agents are used to remove and deactivate metal ions.

### Textiles

During the scouring and bleaching of textile fibers, Dissolvine® chelating agents remove and deactivate metal ions that would otherwise catalyze the decomposition of the peroxide bleaching agent. They also improve the performance of dye baths, where metal ions like Ca and Mg inhibit dye penetrating the fibers.



# Dissolvine® chelates

## The right chemistry

Dissolvine® chelating agents combine amine and carboxylic acid chemistry in one molecule. This powerful chemical combination yields aminopolycarboxylates (APCs), which form more stable complexes with metal ions compared to other chelating agents.

In fact, they are the most commonly used chelates, because of their cost effectiveness and versatility. Compared to other less effective chelating agents, the Dissolvine® chelates are stable over a wider range of temperatures and pH values, have a stronger affinity for metals and are thus significantly more efficient. They also have good water solubility and are inert to most chemicals. Moreover, several products in the Dissolvine® chelate range are readily biodegradable (Closed Bottle Test - OECD 301D) without warning phrases for health and environment and some are bio-based.

Dissolvine® chelates have been designed and fine-tuned to meet the needs of our customers. Our product range is extensive, including chelating agents and metal chelates, in various salt forms, in different purities and in both liquid and solid forms. What is more, we continuously develop new products to better meet requirements in specific application areas. Thanks to our concerted research and development efforts, product quality and consistency are ensured.

# The world of Dissolvine® chelates

We supply the following Dissolvine® chelates listed below. EDTA is generally the preferred choice, but specific applications may require other chelating agents. Common specific properties of these molecules:

### ● EDTA

The most widely used, very strong, cost effective and general purpose chelating agent.

### ● GLDA

The green and strong chelate in our product range. A safe and readily biodegradable chelating agent, that can be used as alternative for NTA, EDTA, phosphates and phosphonates, especially in cleaning applications. It has a high solubility over a wide pH range. It is soluble in acids and in several non aqueous solvents. The largest part of the molecule originates from a natural sustainable source.

### ● MGDA

A safe and readily biodegradable strong chelating agent, that can be used as alternative for NTA, EDTA, phosphates and phosphonates, especially in short contact time cleaning applications.

### ○ Glucoheptonate

A biodegradable chelating agent based on a carbohydrate. It is generally weaker than the aminopolycarboxylates (APCs) mentioned

above. However, it exhibits an exceptional chelating ability for iron hydroxides and other transition metal ions at high pH. As with GLDA, the largest part of the molecule originates from a natural sustainable source.

### ● EDG

A readily biodegradable chelating agent, effective when a relatively weak chelating agent can be used.

### ● DTPA

Recommended when an exceptional strong chelating agent is needed, such as during peroxide bleaching of pulp. It remains more effective under oxidizing conditions. It is also especially suitable for descaling in oilfield applications.

### ● HEDTA

A chelating agent with similar efficacy to EDTA, but labelled with less hazard phrases and pictograms. Particularly useful when high solubility is needed at low pH and for stabilizing iron ions at high pH.

# Choosing the right Dissolvine® chelate

Dissolvine® chelates can be used directly in chemical processes or formulated as water-soluble products. We can discuss your process to establish which product should be used. The type and quantity of metal ions as well as the anions involved in the process need to be considered. An important factor is the strength of the complex formed between the metal ion and the chelating agent. This determines

whether the complex will be formed in the presence of competing anions. The stability or equilibrium constant (K), expressed as log K, has been determined for many metals and chelating agents. The higher the log K values, the more tightly the metal ion will be bound to the chelating agent and the more likely that the complex will be formed.

## Stability constants (log K values)<sup>1</sup>

Metal ion	EDTA	GLDA	MGDA	EDG	DTPA	HEDTA
Al <sup>3+</sup>	16.4	12.2*		7.7	18.6	14.4
Ba <sup>2+</sup>	7.9	3.5	4.8	3.4	8.7	6.2
Ca <sup>2+</sup>	10.6**	6.4**	7.0	4.7	10.8	8.1
Cd <sup>2+</sup>	16.5	9.1*	10.6	7.4	19.0	13.7
Co <sup>2+</sup>	16.5	10.0*	11.1	8.0	18.8	14.5
Cu <sup>2+</sup>	18.8	13.1	13.9	11.8	21.2	17.4
Fe <sup>2+</sup>	14.3	8.7*	8.1	6.8	16.2	12.2
Fe <sup>3+</sup>	25.1	11.7*	16.5	11.6	28.0	19.7
Hg <sup>2+</sup>	21.5	14.3		5.5	26.4	20.1
Mg <sup>2+</sup>	8.7**	5.5**	5.8	3.4	9.3	7.0
Mn <sup>2+</sup>	13.9	7.6*	8.4	5.5	15.2	11.1
Ni <sup>2+</sup>	18.4	10.9*	12.0	9.3	20.1	17.1
Pb <sup>2+</sup>	18.0	10.5*	12.1	9.4	18.8	15.6
Sr <sup>2+</sup>	8.7	4.1	5.2	3.8	9.8	6.8
Zn <sup>2+</sup>	16.5	10.0*	11.0	8.4	18.2	14.6

<sup>1</sup> A.E. Martell, R.M. Smith, NIST Critically selected stability constants of metal complexes (NIST standard reference database 46, Version 7.0, 2003)

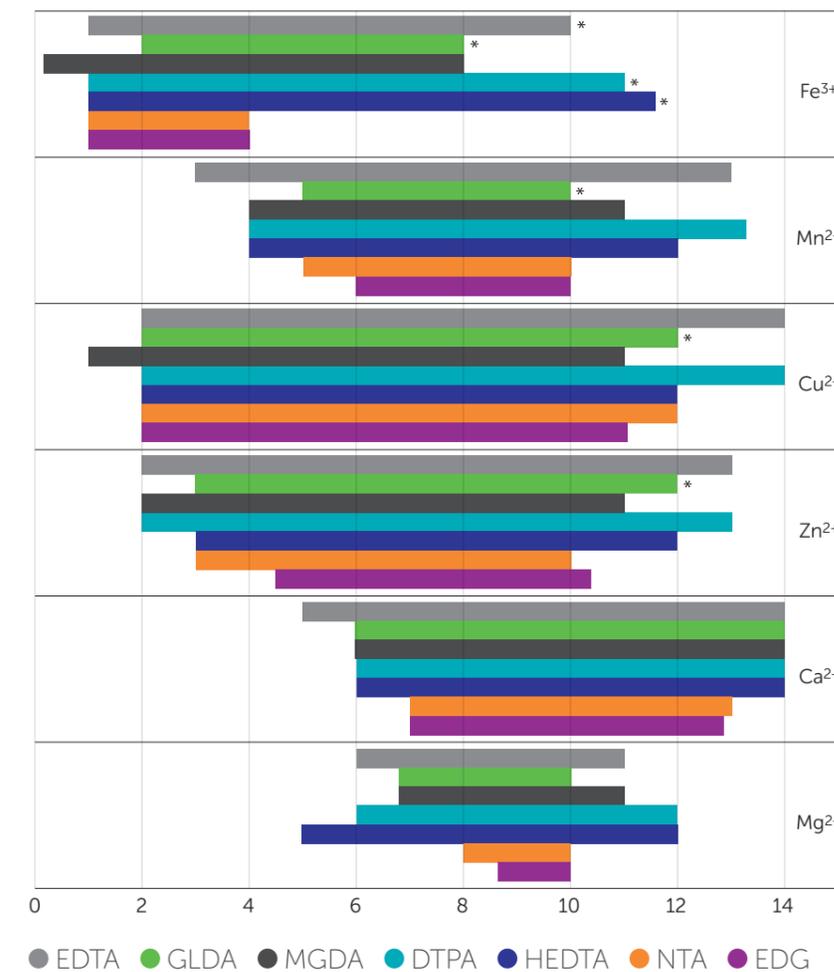
\* As determined by Nouryon

Stability Constants: as determined at an ionic strength of 0.1M and at a temperature of 25°C, or if not available at 20°C.

\*\* C. Bretti et al, Thermodynamic Study on the Protonation and Complexation of GLDA with Ca<sup>2+</sup> and Mg<sup>2+</sup>, J. Chem. Eng. Data 2016, 61, 1895–1903

# Active pH range

The pH of the system and the oxidizing nature of the environment can affect the stability and effectiveness of the chelating system. For each metal complex there is an optimum pH and an active pH range in which the metal complex is stable.



Calculated for a hydroxide environment in demineralized water at 0.1 mol / l.

Lower pH limit: the conditional stability constant logK' ≥ 3. Upper pH limit is based on the precipitation of the metal hydroxide. At upper pH limit, fraction chelated ≥ 95%. For the Fe chelates deviations are possible in the calculation of the upper pH limit.

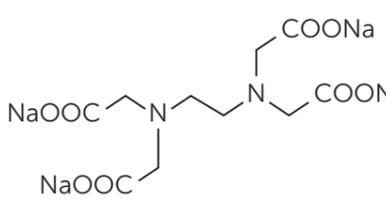
\*= determined by measurement

# EDTA chelating agents

More products are available. Please contact your local sales office.

## Choosing the right chelate for your application

Metals to control	High acidity	Low acidity	Low alkalinity	High alkalinity
Divalent metals	EDTA, GLDA, MGDA, DTPA, HEDTA			
Water hardness	No chelating agent applicable	GLDA, MGDA, HEDTA	EDTA, GLDA, MGDA, DTPA, EDG, HEDTA	
Iron control	GLDA	GLDA, MGDA, HEDTA, EDTA, DTPA	DTPA, HEDTA	Glucoheptonate

Structure And Chemical Name	Dis-solvine®	Chemical Formula	Cas Registry Number	Physical Form	Molecular Mass	Density <sup>1</sup> (Approx.)		Typical Ph Value <sup>2</sup>	Chelation Equivalents Calculated Weight Of Product Needed For One Weight Part Of Metal					Specific Properties	
						kg/m <sup>3</sup>	lb/gallon lb/ft <sup>3</sup>		Ca	Cu	Fe	Mg	Mn		
 <p>Ethylenediaminetetraacetic tetrasodium salt EDTA-Na<sup>4</sup></p>	E-39	EDTA-Na <sub>4</sub>	64-02-8	Liquid (39%)	380.2	1300	10.9	11.5	24	15	18	40	18	Most widely used liquid chelating agent	
	100-S			Liquid (38%)		1270	10.6		25	16	18	41	18	High purity (NTA free)	
	Na			Micro-granular		600	37		11	7.0	7.9	18	8.0	Most widely used solid chelating agent	
	Na-X	EDTA-Na <sub>4</sub>	Tetrahydrate		Crystalline	452.2	900	56	11.5	12	7.2	8.2	19	8.3	High purity (Low NTA)
	220-S	750					47	12		7.2	8.2	19	8.3	High purity (NTA free)	
	Na3-36	EDTA-Na <sub>3</sub> H	150-38-9		Liquid (36%)	358.2	1240	10.4	9.5	25	16	18	41	18	High purity (NTA free) Lower pH without inorganic salt
	Na2	EDTA-Na <sub>2</sub> H <sub>2</sub> Dihydrate	6381-92-6 Anhydrous: 139-33-3		Crystalline	372.2	600	37	4.5	9.4	5.9	6.7	16	6.8	Slightly acidic without inorganic salt
	Na2-S						High purity (NTA free)								
	Na2-P						550	34							Food / Pharma quality (USP/FCC/EP/JP/ACS)
	Solvitar	EDTA-Na <sub>2</sub> Ca Dihydrate	23411-34-9 Anhydrous: 62-33-9		Micro-granular	410.3	700	44	7	-	6.5	7.4	-	7.5	High purity (NTA free) High purity: Food (E385) and Pharma quality (USP/FCC/EP/96-77-EC)
	Am4-50	EDTA-(NH <sub>4</sub> ) <sub>4</sub>	22473-78-5		Liquid (50%)	360.4	1180	9.9	9	18	11	13	30	13	Sodium free
	Am3-40	EDTA-(NH <sub>4</sub> ) <sub>3</sub> H	15934-01-7		Liquid (40%)	343.3	1150	9.6	7	21	14	15	35	16	
	Am2-45	EDTA-(NH <sub>4</sub> ) <sub>2</sub> H <sub>2</sub>	20824-56-0		Liquid (45%)	326.3	1200	10.0	5	18	11	13	30	13	
	K4-50	EDTA-K <sub>4</sub>	5964-35-2		Liquid (50%)	444.6	1300	10.9	11.5	22	14	16	37	16	Sodium free
	K4-100-S				Liquid (45%)		1270	10.6		25	16	18	41	18	
	K3-123-S	EDTA-K <sub>3</sub> H	17572-97-3		Liquid (50%)	406.5	1310	10.9	8	20	13	15	33	15	High purity
Z	EDTA-H <sub>4</sub>	60-00-4		Crystalline	292.2	700	44	2.5	7.4	4.6	5.3	12	5.4	High purity	
Z-S														High purity (NTA free)	

<sup>1</sup> poured bulk density for solids, note: 1000 kg / m<sup>3</sup> = 8.35 lb / gal(for liquids) and 62.43 lb / ft<sup>3</sup> (for solids)

<sup>2</sup> as 1% solution or saturated solution if solubility is < 1%

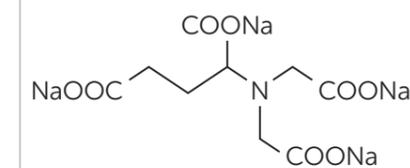
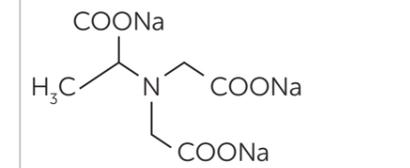
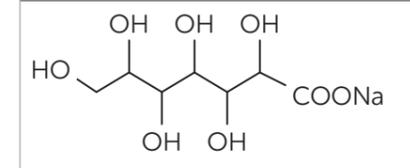
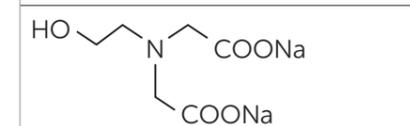
Na3-36, K4-50, K4-100-S, K3-123-S are not available in the EU / nor REACH registered

# Readily biodegradable chelating agents

More products are available. Please contact your local sales office.

## Choosing the right chelate for your application

Metals to control	High acidity	Low acidity	Low alkalinity	High alkalinity
Divalent metals	EDTA, GLDA, MGDA, DTPA, HEDTA			
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Iron control	GLDA	GLDA, MGDA, HEDTA, EDTA, DTPA	DTPA, HEDTA	Glucuheptonate

Structure And Chemical Name	Dis-solvine®	Chemical Formula	Cas Registry Number	Physical Form	Molecular Mass	Density <sup>1</sup> (approx.)		Typical pH Value <sup>2</sup>	Chelation Equivalents Calculated weight of product needed for one weight part of metal					Specific Properties
						kg/m <sup>3</sup>	lb/gallon lb/ft <sup>3</sup>		Ca	Cu	Fe	Mg	Mn	
 Glutamic acid, N,N-diacetic tetrasodium salt <b>GLDA-Na<sub>4</sub></b>	GL-38	GLDA-Na <sub>4</sub>	51981-21-6	Liquid (38%)	351.1	1360	11.4	11.5	23	15	17	38	17	Readily biodegradable and highly soluble. Main part originates from natural sustainable source GL-47-S and GL-PD-S are high purity products. GL-47-S is NTA free.
	GL-47-S			Liquid (47%)		1400	11.7		19	12	13	31	14	
	GL-PD-S			Micro-granular		400	25		11.5	11	6.9	7.9	18	
 Methylglycine N,N-diacetic trisodium salt <b>MGDA-Na<sub>3</sub></b>	M-40	MGDA-Na <sub>3</sub>	164462-16-2	Liquid (40%)	271.1	1331	83.2	11.5	17	11	12	28	12	Readily biodegradable and highly soluble. M40 is NTA free.
 Glucoheptonic sodium salt	CSA	Sodium glucuheptonate	31138-65-5 Also 13007-85-7	Liquid (30%)	248.2	1180	9.9	8.5	More metals can be chelated by one molecule of this chelating agent, depending on the pH					Readily biodegradable chelating agent for application at high alkalinity. Main part originates from natural sustainable source.
 Ethanoldiglycinic disodium salt; <b>EDG-Na<sub>2</sub></b>	EDG	EDG-Na <sub>2</sub>	135-37-5	Liquid (27.5%)	221.1	1180	9.9	11.5	20	13	14	33	15	Readily biodegradable. Also referred to as HEIDA.

<sup>1</sup> poured bulk density for solids, note: 1000 kg / m<sup>3</sup> = 8.35 lb / gal (for liquids) and 62.43 lb / ft<sup>3</sup> (for solids)

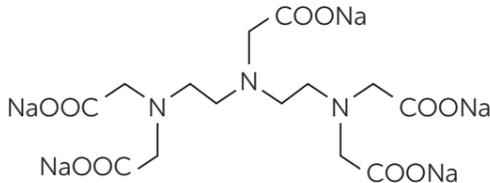
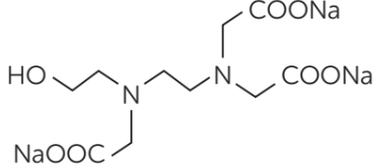
<sup>2</sup> as 1% solution or saturated solution if solubility is < 1%

# Other chelating agents

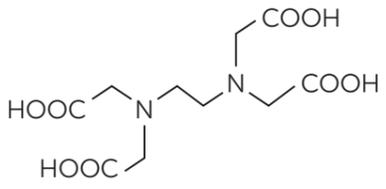
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						kg/m <sup>3</sup>	lb/gallon lb/ft <sup>3</sup>		Ca	Cu	Fe	Mg	Mn	
 Diethylenetriaminepentaacetic pentasodium salt DTPA-Na <sub>5</sub>	D-40	DTPA-Na <sub>5</sub>	140-01-2	Liquid (40%)	503.3	1280	10.7	11.5	31	20	23	52	23	
	D-50			Liquid (50%)		1370	11.4		25	16	18	41	18	
	D-K5-45	DTPA-K <sub>5</sub>	7216-95-7	Liquid (45%)	583.3	1350	10.6		32	20	23	53	24	Sodium free. High purity
	DZ	DTPA-H <sub>5</sub>	67-43-6	Crystalline	393.4	600	37	2	10	6.3	7.2	17	7.3	High purity
	DZ -P	DTPA-H <sub>5</sub>	67-43-6	Crystalline	393.4	600	37	2	10	6.3	7.2	17	7.3	High purity meeting the USP test requirements
 Hydroxyethylethylenediaminetriacetic trisodium salt HEDTA-Na <sub>3</sub>	H-40	HEDTA-Na <sub>3</sub>	139-89-9	Liquid (43%)	344.2	1280	10.7	11.5	20	13	15	33	15	Chelating agent for iron at low alkalinity
	H-50-GS	HEDTA-Na <sub>3</sub> / HEDTA-H <sub>3</sub>	-	Liquid (50%)	-	1320	11.0	5-9	17	11	13	28	13	
	H-88-X	HEDTA-Na <sub>3</sub> 2.5 hydrate	Anhydrous: 139-89-9	Crystalline	389.2	600	37	11.5	9.8	6.2	7.0	16	7.2	

## Food Grade

Structure And Chemical Name	Dis-solvine®	Chemical Formula	Cas Registry Number	Physical Form	Molecular Mass	Density <sup>1</sup> (approx.)		Typical pH Value <sup>2</sup>	Chelation Equivalents Calculated weight of product needed for one weight part of metal					Specific Properties
						kg/m <sup>3</sup>	lb/gallon lb/ft <sup>3</sup>		Ca	Cu	Fe	Mg	Mn	
 Ethylenediaminetetraacetic acid EDTA-H <sub>4</sub>	Solvitar	EDTA-Na <sub>2</sub> Ca Dihydrate	23411-34-9 Anhydrous: 62-33-9	Microgranular	410.3	700	44	7	-	6.5	7.4	-	7.5	High purity (NTA free) High purity: Food (E385) and Pharma quality (USP/FCC/EP/96-77-EC)
	Ferrazone	EDTA-FeNa <sub>3</sub> ·3H <sub>2</sub> O	15708-41-5 (anhydrous) 18154-32-0 (trihydrate)	Powder	421.1	850	53	5	n.a.	n.a.	n.a.	n.a.	n.a.	High purity (NTA free) High purity: Food
	Ferrazone XF			Extra fine powder		600	38	5	n.a.	n.a.	n.a.	n.a.	n.a.	High purity (NTA free) High purity: Food; extra
	Ferrazone BP			Crystalline		850	53	5	n.a.	n.a.	n.a.	n.a.	n.a.	Pharma quality (USP/FCC/EP/96-77-EC)
	Na2-P	EDTA-Na <sub>2</sub> H <sub>2</sub> Dihydrate	6381-92-6 Anhydrous: 139-33-3	Crystalline	372.2	550	34	4.5	9.4	5.9	6.7	16	6.8	Food / Pharma quality (USP/FCC/EP/JP/ACS)

<sup>1</sup> poured bulk density for solids, note: 1000 kg / m<sup>3</sup> = 8.35 lb / gal (for liquids) and 62.43 lb / ft<sup>3</sup> (for solids)

<sup>2</sup> as 1% solution or saturated solution if solubility is < 1%

# Metal Chelates

More products are available. Please contact your local sales office.

Dissolvine®	Chemical Formula	Cas Registry Number	Physical Form	Molecular Mass	Density <sup>1</sup> (approx.)		Application (other than agriculture)
					kg/m <sup>3</sup>	lb/gallon lb/ ft <sup>3</sup>	
E-Ca-3	[EDTA.Ca] Na <sub>2</sub>	Anhydrous: 62-33-9	Liquid	374.3	1190	9.9	Peroxide bleaching
Solvitar	[EDTA.Ca] Na <sub>2</sub> .2H <sub>2</sub> O	+2 aq: 23411-34-9	Micro-granular	410.3	700	44	Food & Pharma
E-Cu-8	[EDTA.Cu] (NH <sub>4</sub> ) <sub>2</sub>	67989-88-2	Liquid	387.8	1250	10.4	Electroplating
E-Cu-9					1330	11.1	
E-Cu-15	[EDTA.Cu] Na <sub>2</sub>	14025-15-1	Micro-granular	397.7	700	44	Coatings, Plasters, Electroplating
E-Mg-3	[EDTA.Mg] Na <sub>2</sub>	14402-88-1	Liquid	358.5	1240	10.4	Peroxide bleaching
E-Mg-6			Micro-granular		700	44	
E-Mn-6	[EDTA.Mn] K <sub>2</sub>	68015-77-0	Liquid	421.4	1330	11.1	–
E-Mn-13	[EDTA.Mn] Na <sub>2</sub>	15375-84-5	Micro-granular	389.1	700	44	–
E-Fe-6	[EDTA.Fe] K	54959-35-2	Liquid	383.2	1350	11.3	DeNOx, Gas sweetening
E-Fe-13	[EDTA.Fe] Na.3H <sub>2</sub> O	15708-41-5	Crystalline	421.1	900	56	Polymer processing, Gas sweetening
E-Zn-9	[EDTA.Zn] (NH <sub>4</sub> ) <sub>2</sub>	67859-51-2	Liquid	389.7	1320	11.0	–
E-Zn-15	[EDTA.Zn] Na <sub>2</sub>	14025-21-9	Micro-granular	399.6	800	50	–
AmFe-50	[EDTA.Fe] NH <sub>4</sub> .NH <sub>4</sub> OH	68413-60-5	Liquid	397.2	1300	10.9	Photography
AmFe-54					1320	11.0	Gas sweetening
D-Fe-3	[DTPA.Fe] Na <sub>2</sub>	100208-96-6 19529-38-5	Liquid	490.2	1280	10.7	–
D-Fe-6	[DTPA.Fe] (NH <sub>4</sub> ) <sub>2</sub>	85959-68-8					
D-Fe-11	[DTPA.Fe] H Na	12389-75-2	Crystalline	468.2	700	44	–
H-Fe-4.5	[HEDTA.Fe] Na	17084-02-5 51181-50-1	Liquid	331.1	1280	10.7	Gas sweetening
H-Fe-5.5-GS			1360		11.4		
H-Fe-13			Micro-granular		500	31	

<sup>1</sup> poured bulk density for solids, note: 1000 kg / m<sup>3</sup> = 8.35 lb / gal (for liquids) and 62.43 lb / ft<sup>3</sup> (for solids)  
<sup>2</sup> as 1% solution or saturated solution if solubility is < 1%



# Recommendation for product use

## Chelating agent product range and applications

Dissolvine®	Building & Construction	Cleaning & Detergents	Industrial cleaning	Feed additives	Food & Pharma	Gas sweetening	Metal plating & Electronics	Oil industry	Personal care	Photography	Polymer production	Printing ink	Pulp & Paper	Textiles
E-39	●	●	●			●	●	●	●	●	●	●	●	●
100-S	●	●	●			●	●	●	●	●	●	●	●	●
Na	●	●	●			●	●	●	●	●	●	●	●	●
Na-X	●						●		●	●				
220-S	●						●		●	●				
Na3-36							●		●	●				
Na2							●		●	●				
Na2-S							●		●	●				
Na2-P				●	●				●					
Solvitar					●									
Am4-50			●					●						
Am3-40			●					●						
Am2-45			●					●						
K4-50		●	●					●						
K4-100-S		●	●					●						
K3-123-S		●	●					●						
Z		●	●						●	●				
Z-S		●	●						●					
GL-38		●	●			●	●	●	●		●	●	●	●
GL-47-S		●	●			●	●	●	●		●	●	●	●
GL-PD-S		●	●			●	●	●	●		●	●	●	●
M-40		●	●			●	●	●	●		●	●	●	●
D-40	●	●	●			●	●	●	●	●	●	●	●	●
D-50	●	●	●			●	●	●	●	●	●	●	●	●
D-K5-45								●						
DZ		●	●		●			●	●	●				
H-40		●	●			●	●	●	●	●	●	●	●	●
H-50-GS						●								
H-88-X							●		●					
EDG		●												
CSA	●		●											●

\* = also USP quality available

## Recommendation for product use

Dissolvine®	Agriculture	Food & Pharma	Gas sweetening	Metal plating & Electronics	Personal care	Peroxide bleaching	Photography	Polymer production
E-Ca-3	●				●	●		
E-Ca-10	●	●			●			
E-Cu-8	●			●				
E-Cu-9	●			●				
E-Cu-15	●			●	●			
E-Mg-3	●					●		
E-Mg-6	●					●		
E-Mn-6	●							
E-Mn-13	●							
E-Fe-6	●		●				●	
E-Fe-13	●		●				●	●
E-Zn-9	●							
E-Zn-15	●							
AmFe-50	●		●				●	
AmFe-54	●		●				●	
D-Fe-3	●							
D-Fe-6	●							
D-Fe-11	●							
H-Fe-4.5	●		●					
H-Fe-5.5-GS	●		●					
H-Fe-13	●		●					

### Functions

- Stopping undesirable precipitation or removing scale / re-dissolving salts
- Controlling metal catalyzed reactions
- A combination of preventing precipitation and controlling metal catalyzed reactions
- Intermediate for metal chelate

# Dissolvine® chelates and the environment

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## We are Nouryon

Your partner in essential chemistry  
for a sustainable future

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We are a global specialty chemicals leader. Industries worldwide rely on our essential chemistry in the manufacture of everyday products such as paper, plastics, building materials, food, pharmaceuticals, and personal care items. Building on our nearly 400-year history, the dedication of our 10,000 employees, and our shared commitment to business growth, strong financial performance, safety, sustainability, and innovation, we have established a world-class business and built strong partnerships with our customers. We operate in over 80 countries around the world and our portfolio of industry-leading brands

includes Eka, Dissolvine, Trigonox, and Berol. For more information please visit: [nouryon.com](http://nouryon.com)

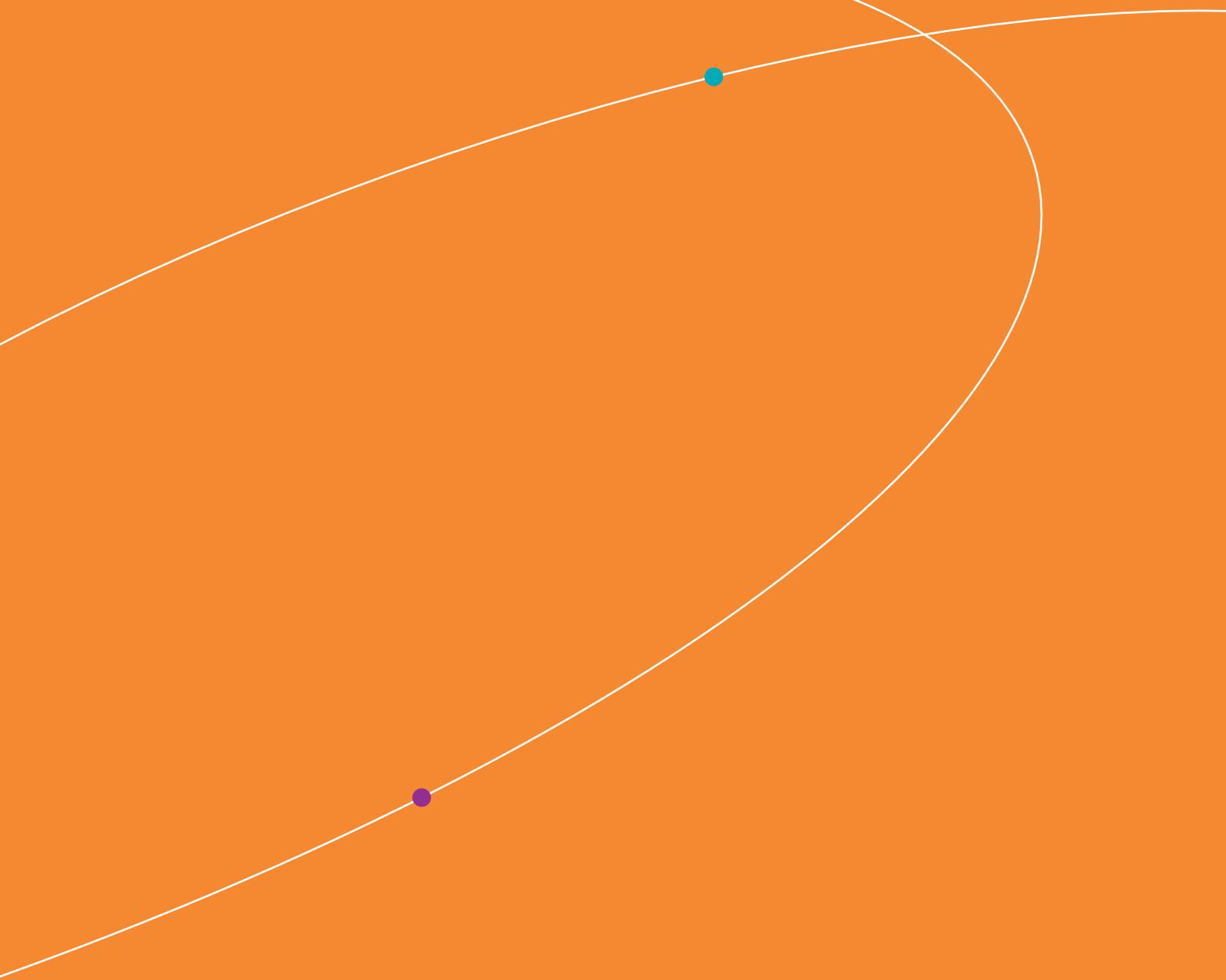
Our Dissolvine® chelates contribute to a broad range of applications that are crucial to modern society. Dissolvine® chelates are marketed through regional centers in China, the Netherlands, and the USA. With production locations in Herkenbosch (The Netherlands), in Lima, Ohio (The United States of America), in Kvarntorp (Sweden) and Ningbo (China), we are committed to supplying our customers around the globe.

**The convenience and economic advantages of using Dissolvine® chelates are coupled with their mild environmental profile.**

**Dissolvine® chelates have been used for many years and extensively studied. Almost all of them have a very low toxicity to plants, animals and humans.**

**Several of our Dissolvine® chelates are readily biodegradable, with the remaining being inherently biodegradable. Additionally two**

**of our products are mainly based on natural and sustainable resources. The biodegradation of the slower degrading ones can be accelerated when biotreated under slightly alkaline conditions. It has also been found that the metal complexes formed in natural environment are degraded photo-chemically. As with all chemicals, chelating agents should always be used responsibly, meeting the technical needs of the application without unnecessarily affecting the environment.**



# Nouryon

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We are a global specialty chemicals leader. Industries worldwide rely on our essential chemistry in the manufacture of everyday products such as paper, plastics, building materials, food, pharmaceuticals, and personal care items. Building on our nearly 400-year history, the dedication of our 10,000 employees, and our shared commitment to business growth, strong financial performance, safety, sustainability, and innovation, we have established a world-class business and built strong partnerships with our customers. We operate in over 80 countries around the world and our portfolio of industry-leading brands includes Eka, Dissolvine, Trigonox, and Berol.

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