



Solutions for Emulsion polymerization of latex resins



Nouryon



Emulsion polymerization

Latex resins are dispersions of polymer particles in water generally supplied at 50% solids concentrations. They are formed by emulsion polymerization, a chemical reaction that links monomers or mixture of monomers in an aqueous surfactant or colloiddally stabilized solution.

There are several key raw materials used in emulsion polymerization.

Monomers – these largely determine the properties of the latex resin and vary wildly in the solubility. As examples, some monomers can be selected because of their hydrophobic nature, high Tg, resistance to UV light, etc.

Surfactants – are used to emulsify insoluble monomers in water, stabilize the latex resin, control polymer particle size and promote efficiency during production

Initiators – form free radicals and are responsible for triggering polymerization

Others – like processing aids, crosslinking monomers, pH regulators, and anti-oxidants that bring special qualities to the latex resins

Our solutions

Our expansive product lines have several touch points with the emulsion polymerization activities.

Surfactants – as a global leader in surfactant technology, we produce anionic, non-ionic, and in some extreme cases cationic surfactants that can be used to improve the production and quality of latex resins made via emulsion polymerization.

Our solutions enable:

- Faster rates of polymerization
- Minimization of coagulum or fouling in the reactor and other process equipment
- Prevention of unacceptably high viscosity during polymerization (which leads to poor heat transfer)
- Maintain or even improve properties in the final product such as tensile strength, gloss, and water absorption

Process aids / Buffers – chelates can regulate pH and improve molecular weight distribution of the polymers in latex resins particularly in metal catalyzed polymerization reactions. In addition they act as metal ion scavengers which can cause polymer breakdown, discoloration, poor heat and light stability, and other undesirable effects. We provide chelating agents like EDTA under the trade name **Dissolvine®**. Biodegradable variations are also available for use in resins and paints for manufacturers wishing to market their products with certain sustainability claims.

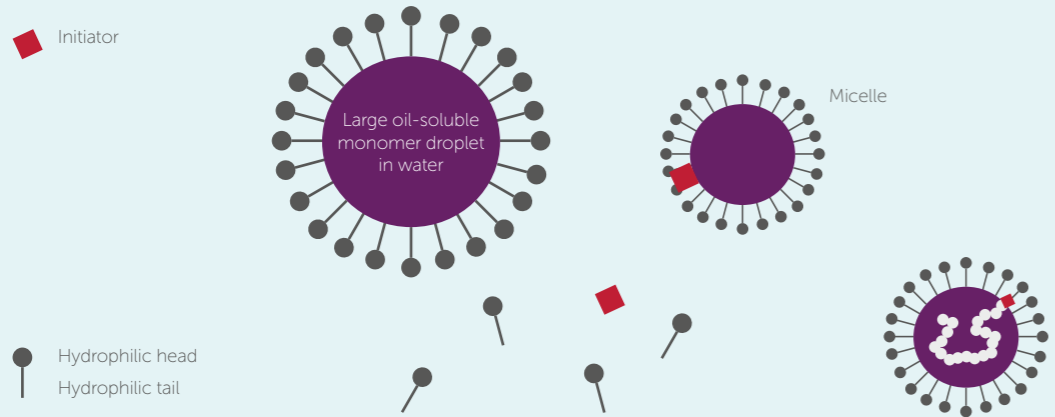
Initiators – we produce organic peroxides under the trade names of **Perkadox®**, **Trigonox®** and **Butanox®**. Organic peroxides play a key role in emulsion polymerization by releasing free radicals which initiates the polymerization process, leading to chain growth, a form of polymerization that grows by successive addition of monomer units.

Trade names for our stabilizers used in emulsion polymerization include:

- **Ethylan®**
- **Berol®**
- **Lankropol®**
- **Sulframin™**
- **Witconate™**
- **Phospholan®**

The following page provides tables for some of the more common surfactants and chelate additives we provide to emulsion polymerization companies.

For initiators, please see our brochure: Initiators for Acrylic Manufacturing.



A depiction of "oil in water emulsion", the type most commonly used in latex resin production for paints where water insoluble monomers

Surfactants

	Product	Description	Active content %	Surface tension mN/m*	Wetting power sec**	Cloud point °C	HLB	CMC g/l	Contact angle	Moles of EO	Linear or branched	Solubility in 5% water	Solubility in other solvents	Specific properties
Nonionic	Berol® 175	C ₁₂ -C ₁₆ alcohol ethoxylate	90	29	15	58-64 (b)	12.5	0.014	50	7.5		Soluble	Ethanol, Proponal, Propylene Glycol	
	Berol® 226	Alcohol ethoxylates and co-surfactants	100	27	17	NA	11	0.11	41.0	mixed product		Soluble	Ethanol, Proponal	
	Berol® 260	C ₉ -C ₁₁ alcohol ethoxylate	99	27	11	55-59 (a)	10.5	0.04	36	4	Linear	Dispersible		Narrow range, Low foaming, Nonylphenol replacement
	Berol® 266	C ₉ -C ₁₁ alcohol ethoxylate	99	27	15	24-29 (b) & 54-59 (b)	12	0.03	36	5.5	Linear	Soluble		Narrow range, Low foaming, Nonylphenol replacement
	Berol® 360	C ₁₀ natural alcohol ethoxylate	99	27	11	55-59 (a)	10.5	0.04	35.8	4		Dispersible		Low foaming, Biobased, Nonylphenol replacement
	Berol® 366	C ₁₀ natural alcohol ethoxylate	99	27	15	24-29 (b) & 54-59 (b)	12	0.03		5.5		Soluble		Low foaming, Biobased, Nonylphenol replacement
	Berol® 609	Nonionic blend	90	28	7	52-60 (b)	13.8	51.6	47.7	9		Soluble		Low foaming, Nonylphenol NP9/10 replacement
	Berol® 611	Nonionic blend	90	28	9	52-58 (b)	12.9	18		mixed product		Soluble	Ethanol, Proponal, Propylene Glycol	Low foaming, Nonylphenol NP9/10 replacement
	Berol® EP 25	C ₈ alcohol ethoxylate	70	50	>600	74 (c)	17.9	5.7	91	25		Soluble		
	Ethylan® 1005	C ₁₀ alcohol ethoxylate	99	27	3	47-53 (a)	11.6	1	40	5	Branched	Dispersible		Low foaming, Nonylphenol replacement
	Ethylan® 1008	C ₁₀ alcohol ethoxylate	100	29	11	64-68 (b)	14	2	51	8		Soluble		
	Ethylan® TD1085	Tridecyl alcohol ethoxylate	85	28	11	65-73 (b)	14	11.1	40	10		Soluble	Ethanol, Proponal, Propylene Glycol	
	Ethylan® TD3070E	Tridecyl alcohol ethoxylate	70	30	>300	75-80 (c)	17.4	69.8	84	30		Soluble		
	Anionic	Lankropol® 4500	Diocetyl sodium sulfosuccinate	70	27	10	NA	12	1.9	72			Dispersible	
Lankropol® K-8300		Disodium oleamido sulfosuccinate	38	33	90	NA	12	2.0	91.1			Soluble		
Lankropol® KPH70		Diocetyl sodium sulfosuccinate	70	26	4	NA	12	1.6	35			Soluble	Xylene	
Sulframin™ B 320		Branched alkylethersulfate, sodium salt	25-28	40	>300			1.83	92.8					
Phospholan® PE169		Isotridecyl alcohol ethoxylate phosphate ester	100	28	23	NA	7	0.02	37	5		Dispersible	Ethanol, Propylene Glycol	
Phospholan® PE65		Alcohol ethoxylate phosphate ester	100	28	>300	NA	7	0.06	68			Dispersible	Ethanol, Proponal, Xylene	
Phospholan® PS-131		Synthetic alcohol ethoxylated phosphate ester	100	28	23	NA	8	0.08	52.1	6		Dispersible		
Witconate® NAS-88		Sodium octane sulfonate	>35	25.5	>300			31.6	108.4	0		Soluble		
Witconater® P-1059		Isopropylamine branched DBBS	100	27	4	NA	10	0.91	50.7	0	Branched	Dispersible		

* according to du Noüy, 25°C, 0.1% DIN 53914

** according to Draves, 25°C, 0.1%

(a) 5 g product in 25 ml 25% butyldiglycol

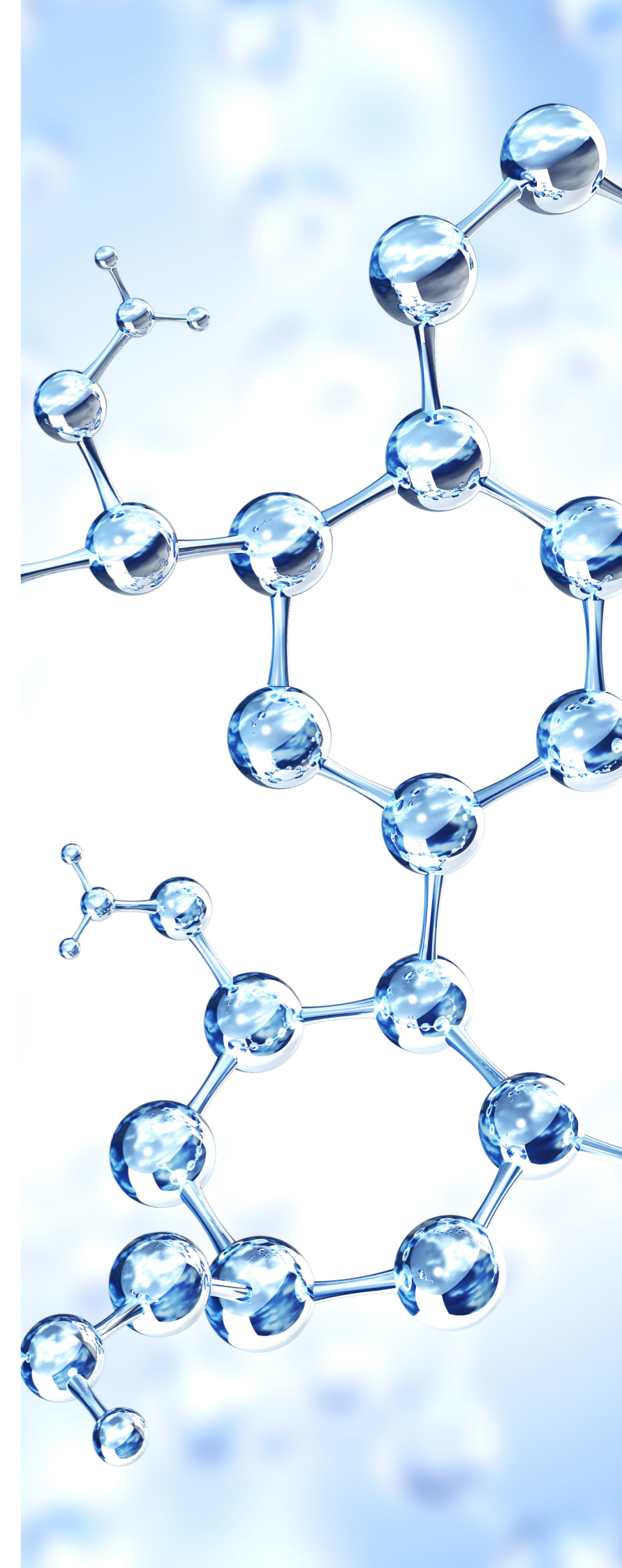
(b) 1% in water

(c) 1% in 10% NaCl

Chelating agents

	Structure and chemical name	Product	Chemical formula	Physical form	Molecular mass	Density kg/m ³	pH typical value*	Specific properties
	 <p>Ethylenediaminetetraacetic tetrasodium salt EDTA-Na₄</p>	Dissolvine® E-39	EDTA-Na ₄	Liquid (39%)	380.2	1300	11.5	Most widely used liquid chelating agent
Standard	 <p>Ethylenediaminetetraacetic acid EDTA-H₄</p>	Dissolvine® E-Fe-13	EDTA-H ₄	Powder	421.1	850	5	Highly effective cation scavenger and pH regulator
	 <p>Diethylenetriaminepentaacetic pentasodium salt DTPA-Na₅</p>	Dissolvine® D-40	DTPA-Na ₅	Liquid (40%)	503.3	1280	11.5	Highly effective chelating agent with tighter bond strength / affinity for complexing cations
Readily biodegradable	 <p>Glutamic acid, N,N-diacetic tetrasodium salt GLDA-Na₄</p>	Dissolvine® GL-47-S	GLDA-Na ₄	Liquid (47%)	351.1	1400	11.5	Readily biodegradable Highly soluble
	 <p>Methylglycine N,N-diacetic trisodium salt MDGA-Na₃</p>	Dissolvine® M-40	MDGA-Na ₃	Liquid (40%)	271.1	1331	11.5	Readily biodegradable Highly soluble, NTA free

* as 1% solution or saturated solution if solubility is <1%



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