SPECIALTY METHACRYLATES
The story of methacrylates at Evonik starts with Otto Röhm

In 1901, Dr. Otto Röhm, a pioneer in methacrylate polymer chemistry, paved the way for a longstanding tradition of innovation within Evonik Industries. With large-scale industrial production of methacrylate monomers and polymers already on the rise in the 1930s, Evonik evolved into the preferred partner for methacrylate solutions globally.

Today the portfolio includes more than 40 specialty methacrylates, offering a versatile toolbox to solve literally any challenge in a broad range of application areas. As a consequence of being at the forefront of innovation, Evonik’s methacrylate labs have developed more than 400 different monomers over the years. As Evonik continues to embrace the innovative spirit of its founders, we personally invite our customers to help add new pages to the book of outstanding collaborations.

VISIOMER®, Evonik’s global trademark for methacrylate monomers, stands for high-quality products, global service and outstanding expertise.
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We hold the tools that shape your future.

As pioneer in the methacrylate chemistry, Evonik has an expansive portfolio that includes more than 40 different specialty monomers.

Specialty Monomers serves a broad range of industries and application areas, and we ensure our toolbox is filled with solutions customized to fit any challenge. We carry the right tools to effectively support your needs and develop innovative products that make you successful.

The building blocks for your solutions are in our toolbox.
VISIOMER® methacrylates are monomers that can be used in different types of radical polymerization techniques. They can be co-monomers in all-acrylic polymers as well as in combination with other unsaturated monomers.

EMULSION POLYMERIZATION
The basis of this polymerization method is the formation of a large amount of dispersed “microreactors” of polymerizable monomer in a continuous phase of water. The components for this reaction are:
- one or several radically polymerizable monomers
- a surfactant capable of emulsifying hydrophobic monomers in water
- a water soluble initiator that can be activated by thermal decomposition or a redox reaction to start the radical polymerization.

SUSPENSION (BEAD) POLYMERIZATION
This technique involves mechanically dispersing monomer in a non-compatible liquid, usually water, and polymerizing the resultant monomer droplets by use of a monomer-soluble initiator. If the process is carefully controlled, polymer is obtained in the form of granular beads, which are easy to handle and can be isolated by filtration or by spray drying. A major advantage is that heat transfer is very efficient and the reaction is therefore easily controlled.

SOLUTION POLYMERIZATION
This polymerization type uses a solvent. Both the resulting resin and the monomers have to be soluble in the solvent used. Peroxides or azo compounds serve as radical initiators. The degree of polymerization and thus the molecular weight of the resulting resin molecules can be adjusted via the initiator and monomer concentrations, the polymerization temperature, chain transfer agents, or even the type of solvents used.

REACTIVE DILUENTS
Reactive systems typically consist of monomer and polymer mixtures that react with each other upon triggering the polymerization by e.g. presence of metal ions, radiation or other means. Initially the monomer acts as solvent/diluent to decrease the overall viscosity of the formulation. After application, the reactive diluent is polymerized to achieve the final properties and to reduce the VOC in contrast to formulations with conventional organic solvents. Reactive diluents are for example used in low VOC lacquers, composite resins or in anaerobic adhesives. The latter are used for bonding and sealing metal.
Methacrylates are versatile building blocks for...

**VISIOMER® methacrylates provide coatings with outstanding performance and make your resin partially biorenewable.**

**Selected Solutions**

**VISIOMER® Terra IBOMA & c-HMA** provide weather- and scratch resistance to solvent borne coatings and allow for reduction of solvent content without compromising leveling and gloss. Resins with IBOMA or CHMA show fast physical drying. VISIOMER® Terra IBOMA contributes to the biorenewable character of your paints.

**Benefits**
- Excellent weather- and scratch resistance
- SB coatings with low VOC, fast physical drying and outstanding leveling and gloss
- Carbon footprint reduction

VISIOMER® methacrylates take shear stability, usability and performance of emulsion paints to a higher level.

**Selected Solutions**

**VISIOMER® MPEG MA's** provide water borne paints with excellent low temperature stability against agglomeration.

**VISIOMER® MEEU** improves paint adhesion and wet scrub resistance.

**VISIOMER® C18 PEG 1105 MA W** promotes associative thickening for better sag control.

**VISIOMER® Long Alkyl Chain Esters** enhance hydrophobicity of emulsion paints and strengthen resin resistance against polar media.

**Benefits**
- Excellent shear stability, viscosity control and adhesion of emulsion paints to a variety of substrates
- Higher resistance against polar chemicals
VISIOMER® methacrylate monomers are used in reactive 2 component adhesive and sealant formulations. Most popular are anaerobic or structural adhesives, based on methacrylates. Emulsion polymers for pressure-sensitive adhesives and sealants also contain VISIOMER®.

**Selected Solutions**

- VISIOMER® IBOMA, BNMA, THFMA and EHMA are used in combination with VISIOMER® crosslinkers for the formulation of structural adhesives.
- VISIOMER® MEEU is used to improve adhesion and cohesion of emulsion polymers for PSA’s.

**Benefits**
- Enhanced cohesive strength and resistance
- Formulation components with low hazard potential
- Increased adhesion to polar surfaces

Evonik’s methacrylates Business Line offers a wide range of low-volatile and low-odor methacrylate monomers as environmentally friendly solutions for full or partial substitution of styrene in composite resins. They are used as reactive diluents or crosslinkers in unsaturated polyester resin (UPR) or vinyl ester formulations.

**Selected Solutions**

- VISIOMER® GLYFOMA is a new, partially bio-based reactive diluent for composite resins. It’s exceptionally low level of vapor pressure facilitates open handling.
- VISIOMER® 1,4-BDDMA and TMPTMA are used as reactive diluents to improve mechanical properties.

**Benefits**
- Low-odor, reactive diluents
- Improved mechanical properties
Constrution

Acrylic materials based on methacrylate monomers are proven solutions in the construction industry. In applications like industrial flooring, reactive road markings, liquid water proofing systems, concrete admixtures and chemical anchoring, methacrylates are easy to process and cure rapidly even at low temperatures.

Selected Solutions

Formulations of water soluble VISIOMER® MPEG MAs and VISIOMER® DMAPMA with hydrophilic crosslinkers like VISIOMER® PEG 200DMA are well established as injection gels.

VISIOMER® GLYFOMA is a new reactive diluent and can be used when low-odor properties are required for flooring or chemical anchoring.

Benefits
- Fast curing, even at low temperatures
- Low-odor, reactive diluent
- Chemical stability

Oil & Gas

Methacrylates and methacrylamides are versatile building blocks in oil and gas applications. Drilling, stimulation, production, midstream, EOR and infrastructure are some of the sub-markets serviced by Evonik.

Our VISIOMER® products show capabilities and innovations in the hydrocarbon lifecycle to:
- Unlock reservoir potential
- Protect and extend asset life and reliability
- Increase and enhance production and throughput

Selected Solutions

VISIOMER® long alkyl chain methacrylates like VISIOMER® C13-MA, C17.4-MA and C18-22-MA are essential constituents of wax inhibitors for flow assurance.

Cationic methacrylates and methacrylamides such as VISIOMER® MAPTAC and TMAEMC are used in water treatment, in both production and stimulation. They act as comonomers in friction reducer polymers for hydraulic fracturing.

Benefits
- Improved flow assurance
- Treatment of high brine waters
SELECTED SOLUTIONS FOR SPECIAL APPLICATIONS

Methacrylates are versatile monomers used in many different application areas. Due to their properties ranging from very hydrophilic to hydrophobic, and imparting Tg’s from –70 °C up to 150 °C, VISIOMER® specialty methacrylates offer the opportunity to tune resin properties and to impart special functionality.

Plastics & Rubber

VISIOMER® 1,4 BDDMA, VISIOMER® EGDMA and VISIOMER® TMPTMA are, co-agents for rubber cross-linking, can replace volatile plasticizers in plastisols or improve mechanical properties of plastic films and artificial marble resins.

Paper & Water & Textile

VISIOMER® MADAME and VISIOMER® DMAPMA are amino functional monomers used as comonomers together with VISOMER® TMAEMC and VISOMER® MAPTAC, two cationic methacrylates for paper sizing, retention agents, dewatering agents, and flocculants.

Surfactants & Thickeners

VISIOMER® MPEG MAs are used as polymerizable surfactants in emulsion polymerization or as comonomers of polymeric surfactants.

VISIOMER® C18 PEG 1105 MA W is a specialty methacrylate for the synthesis of associative thickeners.

Personal Care & Health Care

VISIOMER® UHP-HEMA is a high-purity grade of hydroxy ethyl methacrylate developed for the production of soft contact lenses.

VISIOMER® HEMATMDI, VISIOMER® TRGDMA and VISIOMER® PEG200DMA are used in dental compounds and adhesives for dental applications.

VISIOMER® MADAME and VISIOMER® TMAEMC improve the performance of personal care products.

Benefits

- Tunable resin properties by functional comonomers
- Crosslinkers for improved mechanical and chemical resistance
- Provides special functionalities like amino groups, cationic moieties and hydrophilic side chains
### Vlak-Polymer Powder Series (Meth)Acrylates

<table>
<thead>
<tr>
<th>ALKYL/ARYL (METH)ACRYLATES</th>
<th>VISIOMER® Chemical Name</th>
<th>Chemical Name</th>
<th>CAS No.</th>
<th>CAS No.</th>
<th>CAS No.</th>
<th>Glass transition Temperature Tg</th>
<th>Main applications</th>
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<td>EHMA</td>
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<td>Terra C17.4-MA</td>
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<td>C18-22-MA</td>
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<td>IBOA</td>
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**VISIOMER® Terra Methacrylate Monomers are based on raw materials with Bio-Carbon content.**

Sustainability is one of our guiding principles. Therefore we offer our partially bio-based monomers with a low hazard potential under the product family Vlak-Polymer Powder Series VISIOMER® Terra.

**Product Biocontent:**
- VISIOMER® Terra IBOMA: 71%
- VISIOMER® Terra C13-MA: 76%
- VISIOMER® Terra C17.4-MA: 81%

*Calculated as ratio of C-number alcohol to C-number methacrylate

For more details on properties of our monomers and their application areas, scan the QR code.

**Application Areas:**
- Coatings
- Adhesives
- Composites
- Construction
- Plastics
- Textile & Leather
- Oil & Gas
- Paper & Water
- Personal Care & Health Care
- Synthesis
<table>
<thead>
<tr>
<th>Visiomer®</th>
<th>Chemical Name</th>
<th>Formula</th>
<th>Main applications</th>
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<tbody>
<tr>
<td>AMA</td>
<td>Allyl methacrylate&lt;sup&gt;1&lt;/sup&gt; CAS No. 96-95-9</td>
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<td>EGDMA</td>
<td>Ethylene glycol dimethacrylate CAS No. 97-90-5</td>
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<td>1,3-BDDMA</td>
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<td>TMPTMA</td>
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<td>HEMATMDI</td>
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</table>

For more details on properties of our monomers and their application areas, scan the QR code.

<QR Code>
# ETHER/ACETAL METHACRYLATES

<table>
<thead>
<tr>
<th>VISIONER&lt;sup&gt;*&lt;/sup&gt;</th>
<th>Chemical Name</th>
<th>Formula</th>
<th>Glass transition Temperature Tg</th>
<th>Main applications</th>
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<tbody>
<tr>
<td>ETMA</td>
<td>Ethyl triglycol Methacrylate &lt;br&gt;CAS No. 39670-09-2</td>
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<td>THFMA</td>
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<td>BDGMA</td>
<td>Butyl diglycol Methacrylate &lt;br&gt;CAS No. 7328-22-5</td>
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<td>C18 PEG 1105 MA W</td>
<td>Methacrylic ester (25 EO) C16-C18 fatty alcohol (in water/GMAA) &lt;br&gt;CAS No. 70879-51-5</td>
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<td>GLYFOMA</td>
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# HEMA FOR CONTACT LENSES

<table>
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<tr>
<th>VISIONER&lt;sup&gt;*&lt;/sup&gt;</th>
<th>Chemical Name</th>
<th>Formula</th>
<th>Glass transition Temperature Tg</th>
<th>Main applications</th>
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<tr>
<td>UHP-HEMA</td>
<td>Ultra high purity 2-Hydroxyethyl Methacrylate &lt;br&gt;CAS No. 868-77-9</td>
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**Application Areas:**
- Coatings
- Adhesives
- Composites
- Construction
- Plastics
- Textile <br>& Leather
- Oil & Gas
- Paper <br>& Water
- Personal Care <br>& Health Care
- Synthesis
### AMINO METHACRYLATES

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<th>VISIONER®</th>
<th>Chemical Name</th>
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<tr>
<td>MADAME</td>
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<td>DMAPMA</td>
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<td>TMAEMC</td>
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<td>MAPTAC</td>
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### SPECIALTY METHACRYLAMIDES

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<td>N-MMAA</td>
<td>N-Methylol methacrylamide (aqueous solution) CAS No. 923-02-4</td>
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For more details on properties of our monomers and their application areas, scan the QR code.
### WET ADHESION MONOMERS

<table>
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<th>Chemical Name</th>
<th>Formula</th>
<th>Main applications</th>
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<tr>
<td>MEEU 50 W</td>
<td>N-(2-Methacryloyloxyethyl) ethylene urea (50% in Water) CAS No. 86261-90-7</td>
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<td>MEEU 25 M</td>
<td>N-(2-Methacryloyloxyethyl) ethylene urea (25% in methyl methacrylate) CAS No. 86261-90-7</td>
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### SPECIALTY INTERMEDIATES

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<tr>
<td>MAAH</td>
<td>Methacrylic Anhydride CAS No. 760-93-0</td>
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<td>ECH</td>
<td>Ethylene Cyanohydrin CAS No. 109-78-4</td>
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