BASF
We create chemistry

More sustainable plastics, better environment: Joncryl® ADR additives

Joncryl® functional additives at a glance

Joncryl® functional additives improve production processing and help sustain your business with the following features and benefits:

Chain extension – Improve melt strength, hence better processing (including extrusion, blow molding, and thermoforming) of polycondensation polymers and biopolymers.

Compatibilization – Stabilize polycondensates and biopolymer blends, enhancing mechanical properties of the material.

Hydrolytic stabilization – Ensure stability of polycondensates during manufacturing and protect against hydrolytic degradation and loss of properties.

Plasticization – Allow permanent enhancement of engineering thermoplastics viscoelasticity with high compatibility to the polymer; modify adhesives and sealants as durable tackifiers.

Dispersion – Allow homogenous distribution of pigments, fillers, fibers, and particles in polymeric matrices.

Flow modification – Reduce cycle time and improve surface quality in injection-molded parts while maintaining transparency and heat stability.

Safe handling – Solvent-free; colorless liquid or solid materials with no heavy metals and low level of impurities and free of volatile components.

Key benefits:

- Increase recyclability of polycondensates
- Improve mechanical properties of recycled polycondensates
- Increase extrusion line speed
- Shorter cycle time in injection molding
- Reduce internal stress during packing and cooling of injection molding process
- Improve compatibility between fillers and thermoplastics
- High transparency and mechanical properties retention in virgin resin

Chain extender

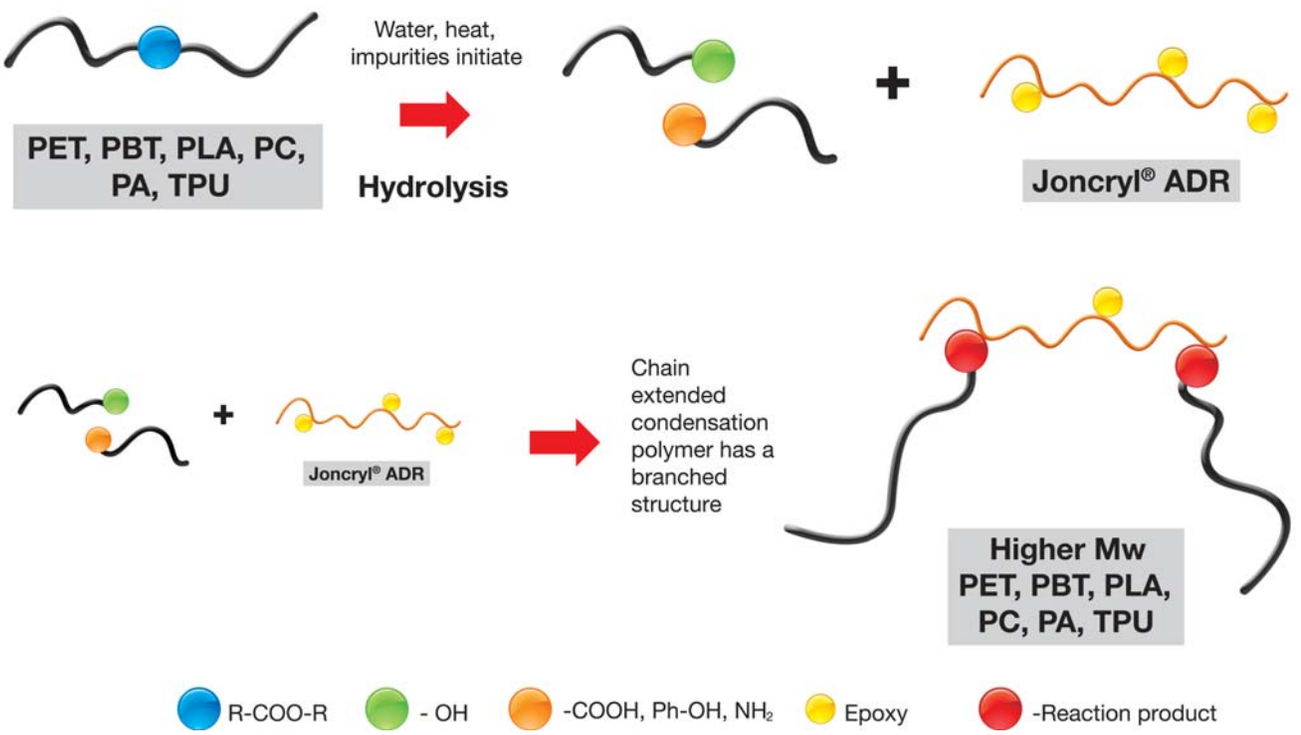
Joncryl® chain extenders series (ADR) raises the molecular weight of polycondensation polymers via reactive processing, providing higher melt strength and allowing for:

- Higher regrind/recycle usage to lower material costs
- Upgrading lower molecular weight polycondensation polymers
- Compatibilization of polycondensate alloys
- Improved hydrolytic stability
- Increased flexibility to process PLA and other biodegradable polymers

Joncryl® chain extender

Chain extension mechanism

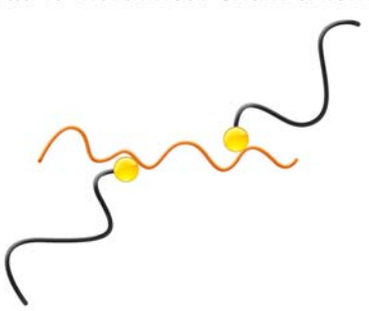
Hydrolysis:



Linear chain extension and chain branching

Linear chain extension with polymeric chain extender

Low number of reactive groups lead to more **linear chain extension**

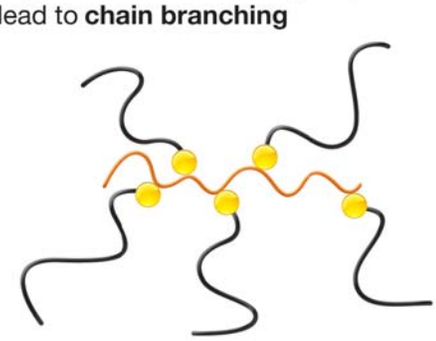


The chain extended polymer remains a mainly linear polymer with higher molecular weight

JONCRYL®

Non-linear chain extension with polymeric chain extender

High number of reactive groups lead to **chain branching**

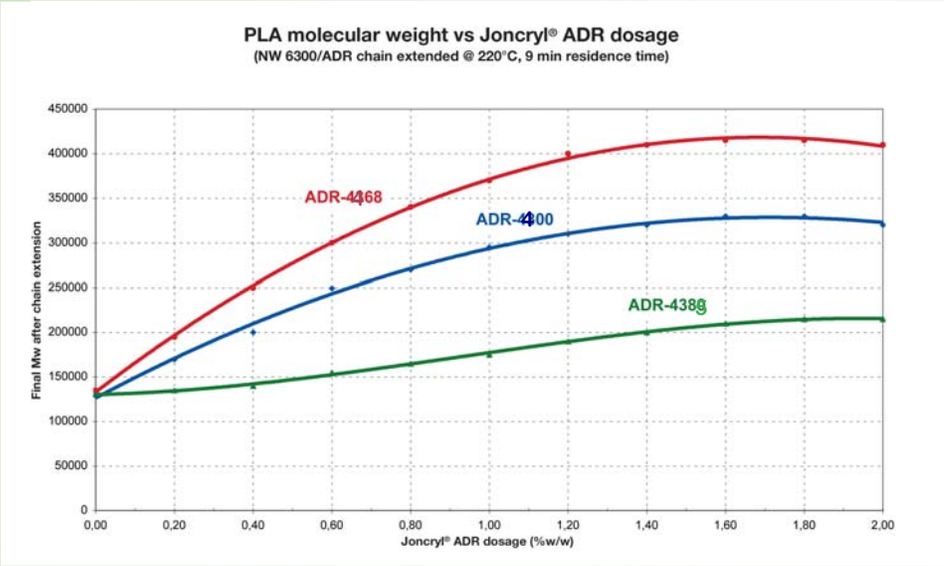


The chain extended polymer will contain some branched and higher molecular weight polymer chains

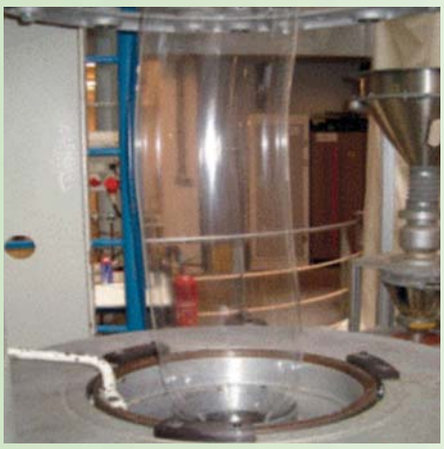
High-value additives for biopolymers

Biopolymer processibility improvement

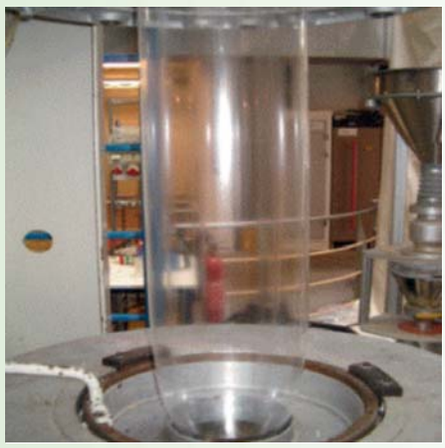
Joncryl® ADR chain extender can enable the manufacturing of chain-extended PLA with higher molecular weight, broader molecular weight distribution, and higher degree of branching. Such chain-extended PLA has higher melt strength and therefore can be processed with greater stability.



PLA blown film



PLA control
Irregular shape
Unstable blow-up ratio
Brittle and low melt strength
Slow line speed
Unstable thickness



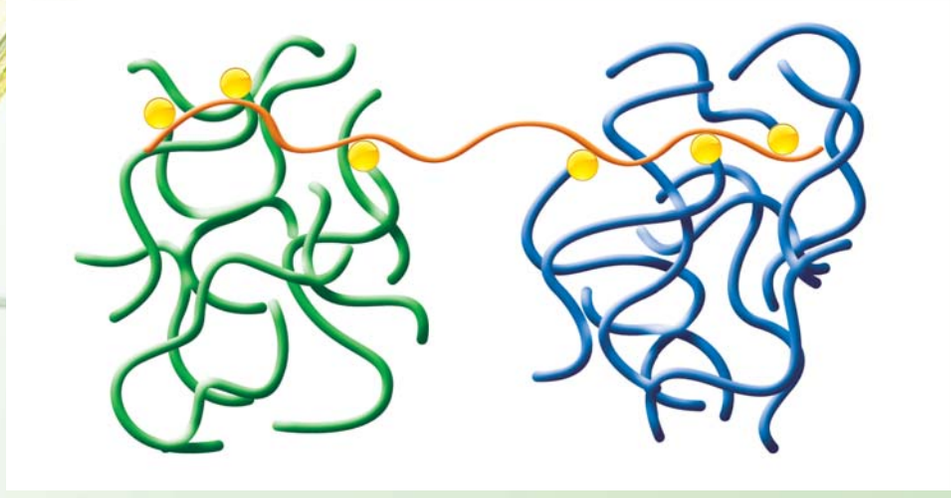
PLA + 0.2% Joncryl® ADR 4468
Regular shape
Maintain blow-up ratio
High melt strength
Doubled line speed
Uniform thickness

PLA foam

Joncryl® chain extenders enable the branching of PLA which results in higher molecular weight and lower density foams with closed cell structures.

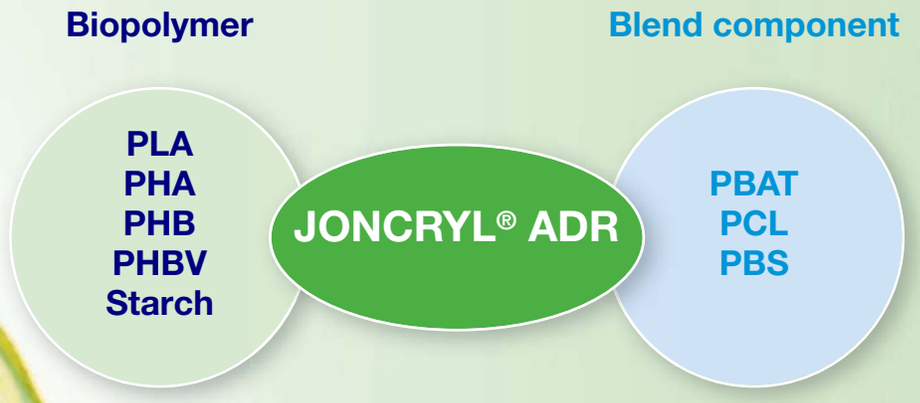
Biopolymer blends

Biopolymers are often used as a blend of two immiscible polymers, e.g. a stiff, brittle biopolymer (PLA) with a soft component. These blends need compatibilization to produce a stable polymer blend.



Biopolymer compatibility and alloying

Chain extenders can act as a reactive compatibilizer for biopolymers and enable them to be alloyed with different blend components. This ability allows biopolymers to be designed for a much wider range of applications.



Recycling of polycondensates

Repair and recycling of regrind condensation polymers

ADR chain extenders can be used to rebuild the polymer chains in reground condensation polymers; ultimately to restore the melt strength of the polymers for stable processing and improve the mechanical strength of the polymers for end-use applications.

Recycling applications

Recycling applications PET sheet and films

Chain extenders can be used to rebuild molecular weight of PET sheet trims and recycled PET bottle-flakes, recycling them into extruded PET sheets.

Strapping

Joncryl® ADR4400 improves tensile strength and elongation in strapping applications. It allows straps to be made of up to 100% recycle PET.

Fibers

Chain extenders ADR 4400 / ADR 4385 can be used to improve the tensile properties of re-cycled PET for high-tenacity fiber.

Reactive compatibilization

Chain extenders can be used to compatibilize different types of polycondensation polymers into a useful alloy, widening the engineering design freedom for creating new materials that meet challenging requirements.

Properties and applications

Product family	ADR-4400	ADR-4468	ADR-4385
Description chain extension	linear to medium branched	medium to highly branched	linear to medium branched
Product form	granule	granule	liquid
Molecular weight (Mw)	5,500	6,800	6,000
Glass transition Tg (°C)	56	54	–37
Epoxy equiv. wt (g/mol)	445	285	450
Non-volatile (% by GC)	>98	>98.7	>98
Viscosity (25 [Pa s])	n/a	n/a	70
Food contact compliance	EU	EU/US FDA[1]	EU
Typical dosage (%)	0.1–1.0	0.1–1.0	0.2–1.5
Temp. range (°C)	170–330	170–330	170–300

Detailed technical data sheet available on request

BASF is a world leader in providing polymers for the plastics, printing and packaging, coatings, and related industries. We provide consultative customer guidance with the selection and application of our functional additive products. Our staff of experts is eager to assist you in meeting your application challenges.

BASF's goal is to design products that improve product performance and enhance productivity while preserving the environment. We use state-of-the-art, fully computerized manufacturing facilities to continually improve our processes. We are ISO-14001-certified for our environmental management system and fully ISO-9001:2000-certified for our quality system.