Medical Grade Polycaprolactone (PCL)

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Main features and benefits of Polycaprolactone:

- medical grade, manufactured under EN ISO 13485
- purity: > 99.0 %
- high viscosity for high tenacity yarns
- synonym: poly(hexano-6-lactone)
- CAS number: 24980-41-4

Polycaprolactone (PCL) is a long-term biodegradable polyester with a low melting point of around 60 °C and a glass transition temperature of about −60 °C. PCL is prepared by ring-opening polymerization of ε-caprolactone and is FDA approved for drug delivery devices and as adhesion barriers.

PCL is highly soluble in chlorinated hydrocarbons and can be used for thermal processing like extrusion, fiber spinning, injection molding and 3D-printing.

PCL is degraded by hydrolysis of its ester linkages in physiological conditions (such as in the human body) and has therefore received a great deal of attention for use as an implantable biomaterial, especially for the manufacture of long-term implantable medical devices. Due to the high viscosity of 1.6-2.2 dl/g, PCL granules from ITVP Denkendorf are excellently suited for the production of high-tenacity monofilament- and multifilament yarns and for Barbed Sutures. Both, high tenacity PCL monofilaments and unique Barbed Sutures can also be ordered at ITVP.

Polycaprolactone (PCL)

Description	Polycaprolactone is a homopolymer of ε-caprolactone with an inherent viscosity of 1.6–2.2 dl/g. It is primarily used for medical device applications, especially for high tenacity sutures and can also be used with other common processing techniques (e.g. extrusion, injection molding or others).		
Specification	Test	Method	Specification
	Appearance	Visual	White
	Identification	NMR	Conforms to reference
	Residual monomer	NMR	≤ 1 wt. %
	Inherent viscosity	HFIP, 30 °C, 0.8 g/dl, I	1.9 dl/g ± 0.3 dl/g
	Melting point	DSC	57.5 °C ± 2.5 °C
	Water content *	Coulometry	≤ 0.5 %
	Element impurities*	ICP	Tin content ≤ 30 ppm Other metals ≤ 10 ppm
Identification	Molecular formula	$(C_6H_{10}O_2)_n$	
	Chemical name	Poly(2-oxepanone)	
	CAS-No.	24980-41-4	
Packaging	Polycaprolactone is supplied in 1 kg or 5 kg packages. Inner bag is made from PE, outer bag is an aluminium coated bag. Shipment takes place in an additional container for mechanical protection.		
Storage and Handling	To keep the polymer properties stable and to avoid degradation over a storage time of 5 years, a storage temperature < -15 °C is recommended. Before opening a bag, allow the material to come to room temperature to avoid dew formation. After partial withdrawal of Polycaprolactone it is best to seal the original bag under nitrogen and to store again at < -15 °C.		

* Not tested on each batch

ITV Denkendorf Produktservice GmbH (ITVP) is a subsidiary of the DITF (German Institutes of Textile and Fiber Research Denkendorf), Europe's largest textile research center. ITVP is certified according EN ISO 13485 for the development and production of polymers, pre-products and devices for medical applications, but is not actively marketing medical devices for the final consumer. The main focus lies on textile-based implants like e.g. surgical sutures and ligaments for wound closure, PP meshes for hernia repair and absorbable meshes for soft-tissue reinforcement and breast reconstruction, vascular prostheses for blood vessel replacement and stents for use in the trachea and oesophagus.

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DS05/10-18