PHBV poly(3-hydroxybutyrate-co-3-hydroxyvalerate)

PARAMETER	UNIT	VALUE	REFERENCES
GENERAL			
Common name	-	poly(3-hydroxybutyrate-co-3-hydroxyvalerate)	
CAS number	-	80181-31-3	
HISTORY			
Date	-	1983	
Details	-	Imperial Chemical Industries (first manufacturer)	
SYNTHESIS			
3-Hydroxyvalerate content	%	2-80	Scheithauer, E C; Li, W; Ding, Y; Harhaus, L; Roether, J A; Boccaccini, A R, Mater. Lett., 158, 66-9, 2015; Berezina, N; Yada, B, New Biol., in press, 2015.
Method of synthesis	-	biosynthesis	
Mass average molecular weight, M_w	dalton, g/mol, amu	127,000-590,000	Jost, V; Langowski, H-C, Eur. Polym. J., 68, 302-12, 2015; Arcos-Hernandez, M V; Laycock, B; Donose, B C; Pratt, S; Halley, P; Al-Luaibi, S; Werker, A; Lant, P A, Eur. Polym. J., 49, 904-13, 2013.
STRUCTURE			
Crystallinity	%	59	Jost, V; Langowski, H-C, Eur. Polym. J., 68, 302-12, 2015.
COMMERCIAL POLYMERS			
Some manufacturers	-	TianAn; Metabilix	
Trade names	-	Enmat; Biomer L	
PHYSICAL PROPERTIES			
Melting temperature, DSC	°C	165-176; 169 (DSC)	Jost, V; Langowski, H-C, Eur. Polym. J., 68, 302-12, 2015. Daitx, T S; Carli, L N; Crespo, J S; Mauler, R S, Appl. Clay Sci., 115, 157-64, 2015.
Glass transition temperature	°C	-20.4 to -12.4	Arcos-Hernandez, M V; Laycock, B; Donose, B C; Pratt, S; Halley, P; Al-Luaibi, S; Werker, A; Lant, P A, Eur. Polym. J., 49, 904-13, 2013.
Permeability to nitrogen, 25°C	barrer	0.033	Cretois, R; Follain, N; Dargent, E; Soulestin, J; Bourbigot, S; Marais, S; Lebrun, L, J. Membrane Sci., 467, 56-66, 20147.
Permeability to oxygen, 25°C	barrer	0.031	Cretois, R; Follain, N; Dargent, E; Soulestin, J; Bourbigot, S; Marais, S; Lebrun, L, J. Membrane Sci., 467, 56-66, 20147.
Diffusion coefficient of water vapor	$cm^2\ s^{-1}$ $x10^6$	0.00124	Cretois, R; Follain, N; Dargent, E; Soulestin, J; Bourbigot, S; Marais, S; Lebrun, L, J. Membrane Sci., 467, 56-66, 20147.

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PARAMETER	UNIT	VALUE	REFERENCES
MECHANICAL & RHEOLOGICAL PROPERTIES			
Tensile strength	MPa	31.3-37.8	Jost, V; Langowski, H-C, Eur. Polym. J., 68, 302-12, 2015. Daitx, T S; Carli, L N; Crespo, J S; Mauler, R S, Appl. Clay Sci., 115, 157-64, 2015.
Elongation	%	0.8-1.7	
Young's modulus	MPa	3,761-4,583	Jost, V; Langowski, H-C, Eur. Polym. J., 68, 302-12, 2015. Daitx, T S; Carli, L N; Crespo, J S; Mauler, R S, Appl. Clay Sci., 115, 157-64, 2015.
Melt index, 190°C/10 kg	g/10 min	16.3	Masood, F; Yasin, T; Hameed, A, Int. Biodet. Biodeg., 87, 1-8, 2014.
BIODEGRADATION			
Typical biodegradants	-	composting conditions	Weng, Y-X; Wang, Y; Wang, X-L; Wang, Y-Z, Polym. Testing, 29, 579-87, 2010.
TOXICITY			
HMIS: Health, Flammability, Reactivity rating	-	0/0/0	
PROCESSING			
Additives used in final products	-	halloysite	
Applications	-	microspheres for drug release, medical implants	
Outstanding properties	-	biodegradability, biocompatibility, thermoplastic behavior	
BLENDS			
Suitable polymers	-	PCL, PEO, PLA	Mofokeng, J P; Luyt, A S, Thermochim Acta, 613, 41-53, 2015.