

CB cellulose butyrate

PARAMETER	UNIT	VALUE	REFERENCES
GENERAL			
Common name	-	cellulose butyrate	
CAS name	-	cellulose, butanoate	
Acronym	-	CB	
CAS number	-	9015-12-7	
SYNTHESIS			
Monomer(s) structure	-	cellulose; $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHOCl}$; $(\text{CH}_3\text{CH}_2\text{CH}_2\text{CO})_2\text{O}$	
Monomer(s) CAS number(s)	-	9004-34-6; 141-75-3; 106-31-0	
Monomer(s) molecular weight(s)	dalton, g/mol, amu	depends on raw material; 106.55; 158.19	
Method of synthesis	-	cellulose butyrate is produced by reaction of cellulose with butyric anhydride or butyryl chloride, and condensing agents such as ZnCl_2 or H_2SO_4 ; use of catalyst such as H_2SO_4 is very important in this synthesis because reaction between cellulose and anhydride is very slow	
Catalyst	-	H_2SO_4	
STRUCTURE			
Crystallinity	%	36-45	
Cell type (lattice)	-	orthorhombic	Zugenmaier, P J, Appl. Polym. Sci., Polym. Symp., 37, 223, 1983.
Cell dimensions	nm	a:b:c=3.13:2.56:1.036	Zugenmaier, P J, Appl. Polym. Sci., Polym. Symp., 37, 223, 1983.
Number of chains per unit cell	-	8	Zugenmaier, P J, Appl. Polym. Sci., Polym. Symp., 37, 223, 1983.
Chain conformation	-	2/1 helix	
PHYSICAL PROPERTIES			
Density at 20°C	g cm^{-3}	1.17; 1.19 (crystalline)	
Refractive index, 20°C	-	1.47-1.48	
Melting temperature, DSC	°C	115-178; 192	
Decomposition temperature	°C	315	
Glass transition temperature	°C	106-130; 81 (amorphous)	
Maximum service temperature	°C	80	
Long term service temperature	°C	50	
Hildebrand solubility parameter	$\text{MPa}^{0.5}$	17-24	
Speed of sound	m s^{-1}	35.7	
Acoustic impedance		2.56	
Attenuation	dB cm^{-1} , 5 MHz	21.9	
MECHANICAL & RHEOLOGICAL PROPERTIES			
Tensile strength	MPa	24-76	
Elongation	%	8-80	
Water absorption, equilibrium in water at 23°C	%	0.9-2.4	
Moisture absorption, equilibrium 23°C/50% RH	%	0.2	

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CHEMICAL RESISTANCE			
Acid dilute/concentrated	-	good/poor	
Alcohols	-	poor	
Alkalis	-	good	
Aliphatic hydrocarbons	-	good	
Aromatic hydrocarbons	-	poor	
Halogenated hydrocarbons	-	poor	
Ketones	-	poor	
⊖ solvent, ⊖-temp.=57°C	-	tetrachloroethane	
Good solvent	-	benzene, chloroform, cyclohexanone, tetrachloroethane	
Non-solvent	-	cyclohexane, diethyl ether, hexanol, methanol	
PROCESSING			
Preprocess drying: temperature/ time/residual moisture	°C/h/%	extrusion, thermoforming	
Additives used in final products	-	Plasticizers: octyl adipate, o-phenylphenol ethylene oxide adduct, N-toluene sulfonamide; Antiblocking: silica; Release: fluorochemical, microcrystalline wax, polyethylene wax, silicone; Slip: alumina, magnesium stearate, polyethylene wax, silica	
Applications	-	corner guards, rocket fuels, sheets, tools, tubing	
BLENDS			
Suitable polymers	-	PHB	

