

XG xanthan gum

PARAMETER	UNIT	VALUE	REFERENCES
GENERAL			
Common name	-	xanthan gum, polysaccharide B-1459	Palaniraj, A; Jayaraman, V, J. Food Eng., 106, 1-12, 2011.
CAS name	-	xanthan gum	
Acronym	-	XG	
CAS number	-	11138-66-2	
EC number	-	234-394-2	
HISTORY			
Person to discover	-	Jeanes, A R	
Date	-	1961	
Details	-	developed process of XG biosynthesis	
SYNTHESIS			
Monomer ratio	-	glucose:mannose:glucuronic acid=2:2:1	
Acetate content	%	1.9-6.0	Garcia-Ochoa, F; Santos, V E; Casas, J A; Gomez, E, Biotech. Adv., 18, 7, 549-79, 2000.
Pyruvate content	%	1.0-5.7	Garcia-Ochoa, F; Santos, V E; Casas, J A; Gomez, E, Biotech. Adv., 18, 7, 549-79, 2000.
Method of synthesis	-	xanthan gum is produced by culturing <i>Xanthomonas campestris</i> on a well-aerated medium containing commercial glucose, organic nitrogen sources, dipotassium hydrogen phosphate and appropriate trace elements	Palaniraj, A; Jayaraman, V, J. Food Eng., 106, 1-12, 2011.
Temperature of biosynthesis	°C	28-30	
Time of polymerization	h	100	
Yield	g l ⁻¹	11-15 (depending on carbon source; glucose is the most frequently used in commercial production); 50% sugar conversion	
Mass average molecular weight, M _w	dalton, g/mol, amu	2,000,000-20,000,000	
Polydispersity, M _w /M _n	-	1.014	Faria, S; de Oliveira Petkowicz, C L; de Morais, S A L; Terrones, M G H; de Resende, M M; de Franca, F P; Cardoso, V L, Carbohydrate Polym., in press, 2011.
STRUCTURE			
Chain conformation	-	right-handed, fivefold helix	right-handed, fivefold helix
COMMERCIAL POLYMERS			
Some manufacturers	-	Merck, Pfizer, Rhone Poulenc	
PHYSICAL PROPERTIES			
Color	-	white to light yellow to brown	
Odor	-	mild	
Initial decomposition temperature	°C	58 (dehydration, approx. 15%); 266.4 (weight loss exceeding 40%)	Zohuriaan, M J; Shokrolahi, F, Polym. Test., 23, 575-79, 2004.

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MECHANICAL & RHEOLOGICAL PROPERTIES			
Water absorption, equilibrium in water at 23°C	%	8-15	
CHEMICAL RESISTANCE			
Good solvent	-	water (hot and cold)	
FLAMMABILITY			
Autoignition temperature	°C	>200	
Char at 600°C	%	27.5	Zohuriaan, M J; Shokrolahi, F, Polym. Test., 23, 575-79, 2004.
BIODEGRADATION			
Typical biodegradants	-	fungal cellulases catalyse cleavage of main chain	Katzbauer, B, Polym. Deg. Stab., 59, 1-3, 81-4, 1998.
TOXICITY			
NFPA: Health, Flammability, Reactivity rating	-	1/1/0	
Carcinogenic effect	-	not listed by ACGIH, NIOSH, NTP	
PROCESSING			
Applications	-	cosmetics (creams, lotions, shampoos, toothpaste), industrial (adhesives, agricultural chemicals, cleaners, drilling mud, paints, paper, textile and carpet printing), food thickening (bakery products, beverages, dairy products, salad dressings, sauces, soups), medical (anti-tumor activity), pharmaceutical (emulsions, suspensions, tablets)	Palaniraj, A; Jayaraman, V, J. Food Eng., 106, 1-12, 2011.
BLENDS			
Suitable polymers	-	chitosan, CMC, PEO, PR, starch	
ANALYSIS			
FTIR (wavenumber-assignment)	cm ⁻¹ /-	C=O – 1710-1730, 1530-1650; C-H – 1420-1430; C-O – 1050-1150	Faria, S; de Oliveira Petkowicz, C L; de Morais, S A L; Terrones, M G H; de Resende, M M; de Franca, F P; Cardoso, V L, Carbohydrate Polym., in press, 2011.
NMR (chemical shifts)	ppm	α-anomeric protons – 5.1 and 5.2; β carbons of pentoses and hexoses – 4.8 and 4.9; hydrogen near OH group – 4.0; uronic acid – 2.3	Faria, S; de Oliveira Petkowicz, C L; de Morais, S A L; Terrones, M G H; de Resende, M M; de Franca, F P; Cardoso, V L, Carbohydrate Polym., in press, 2011.

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