

Global Polyols

2011/12 – 2015

Special focus on Europe, Americas, China, India, Thailand, Indonesia
Supply, Demand, Competitive Trends and Forecast in Key Sectors

INTRODUCTION The continuously increasing awareness of obesity as a health menace is having a major impact on the nutritive and non-nutritive sweetener markets in both developed and developing countries. Numerous food producers are examining sweetener use. The recent entry of stevia and sucralose in the West, along with the interesting 'all natural' erythritol-stevia combination, have increased the dynamics in this sector. Additional production capacities, patent expiries and above all, the increasing role of China as a producer and user country have renewed the interest in polyols. Additional driving forces include the current financial and economic crisis across the world and the continuing uncertainty about future oil prices which have their impact on polyol usage in chemical and pharmaceutical sectors too.

The demise of the Atkins craze has highlighted the need to examine the right combination of ingredients so that the consumer not only obtains the benefits of low calorie, but is also not deprived of any major food constituent. This also has a direct implication on the sweetener business as a whole. Contradictory medical studies concerning the possible impact of HFCS, sucrose, etc. on human health and major changes in regulations, raw material supply and energy costs are increasing the uncertainty in this industry. Polyols, or sugar alcohols, are a major part of the sweetener industry, and they also have a strong role to play in chosen non-food sectors such as oral hygiene, vitamin C production, pharmaceutical use, etc. Given these various changes in the market place, there is clearly a need for a thorough market study which evaluates the various qualitative and quantitative aspects across key markets and provides forecasts in these diverse and complex markets.

Giract, the food ingredients and technology business review specialist, has a background of 40 years' research and forecasting. It has an unparalleled understanding of the dynamics of the marketplace and privileged contacts with opinion leaders worldwide. It has published several multi-client studies on polyols since 1998, the most recent one in 2009.

As a key player or a company wishing to learn more about these buoyant ingredients, this study serves a dual purpose for you - to help explore and exploit these high-profile markets and to make full use of an in-depth understanding of the market drivers to develop your overall business strategy for this sector.

OBJECTIVES

- To examine the trends in production, prices and producers of these ingredients
- To evaluate the market trends for end-products using polyols
- To estimate current demand for polyols across regions and end-use sectors, both food and non-food
- To understand the 'why' and 'why not' concerning the use/non-use of these ingredients by key end-users in the food and non-food sectors across regions
- To forecast demand to 2015 by ingredient across end-use sectors and regions

PRODUCTS

Sorbitol liquid, sorbitol powder, mannitol, crystalline maltitol, liquid maltitol (HGS and HSH), isomalt, lactitol, xylitol and erythritol

MARKETS

Global supply and demand, with focus on Europe (EU27, Switzerland, Norway), N. America (USA, Canada, Mexico), Other America (Brazil), China, India, Thailand and Indonesia

End-use sectors covered: chewing gum, other confectionery, bakery, other food, oral care, pharmaceuticals, Vitamin C, other non-food

TIMESCALE

2011/12 – 2015

PROGRAMME

Following an initial review of Giract's extensive in-house data, the dominant element of the study was interviews with key actors - producers, end-users, industry experts and authorities - in order to derive real understanding of the latest changes in market forces

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Kt	Erythritol	Isomalt	Lactitol	Maltitol liq	Crystalline Maltitol	Mannitol	Sorbitol liq	Sorbitol powder	Xylitol	Total
Europe										
North America										
South America										
PR China										
India										
Thailand										
Indonesia										
ROW										
TOTAL										

Production of Polyols by Area- Global 2011/12

China is, with 38%, the dominant producer of polyols in the world, followed by Europe and USA. Indonesia and India are similar in size and it will be interesting to see which of the two will be developing fastest to claim the fourth place.

Only 5% of polyol production takes place in the rest of the world, essentially Japan and S.Korea. Giract has not performed the same in-depth analysis for these countries but has provided its best estimates of the 2011/12 output on the basis of global demand and trade data.

Estimated polyol production in ROW - 2011/12

kt	Erythritol	Isomalt	Lactitol	Maltitol liq	Crystalline Maltitol	Mannitol	Sorbitol liq	Sorbitol powder	Xylitol	Total
Japan										
S. Korea										
Pakistan										
TOTAL										

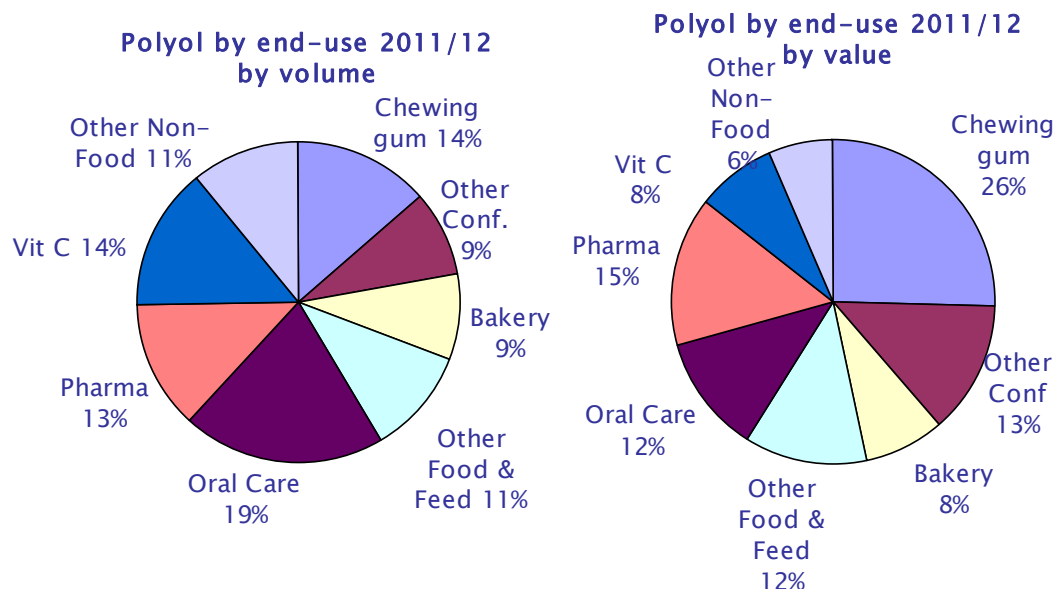
Each of these sectors will be summarised in the following sections.

In the non-food markets liquid sorbitol is the dominant product with 91%, except for the pharmaceutical sector where there is also a substantial use of mannitol and powdered sorbitol. Oral care (19%) and Vitamin C (13%) are the two most important sectors in terms of volume with xxxkt or 35% of the total polyol demand.

In the food sectors, chewing gum (14%) is the most important sector. Together with other confectionery (9%) they represent the applications where the variety of polyol usage is the most diversified. Bakery and other food and feed sectors are again important for sorbitol use mainly.

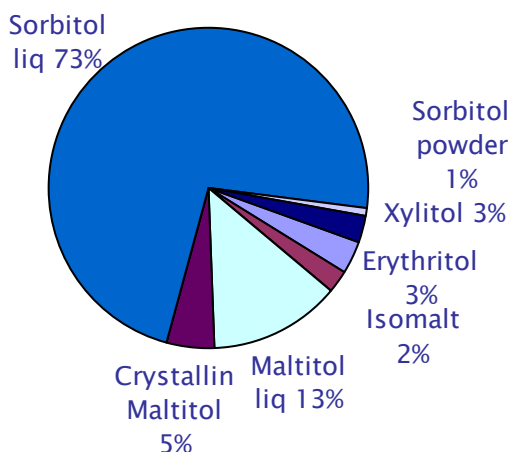
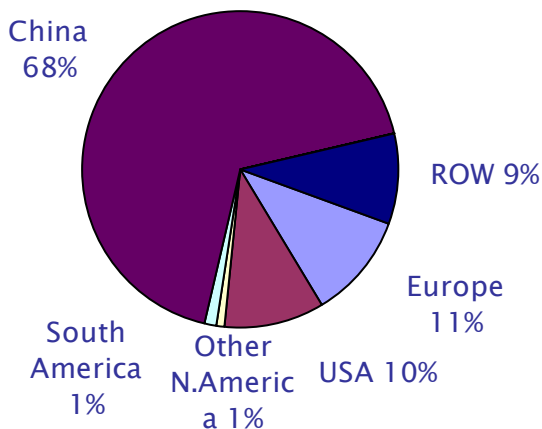
However, the relative importance of the sectors looks entirely different when considering the value of polyols in these markets. While the largest volumes (57%) are being used in the non-food sectors, these only represent 38% of the value of the total polyol market. The highest value share of polyols is in food with 62%, and more particularly in chewing gum. This share has increased from 59% since 2008/9 and indicates that the relative value growth in food is higher than in non-food sectors.

Chewing gum is, with 26% still the most important sector in polyol value and almost twice as large as other sugar-free confectionery, the next most important sector. Together they make up 41% of the entire market value. Until today, chewing gum has remained the most buoyant sector and has grown by 28% in value since 2008/9. It is believed to present further opportunities for growth and diversification in polyols beyond its staggering current value of USD xxx mio. The same is also true for the other confectionery sector.



2.2.3. BAKERY

Polyol use in bakery



Polyols use in bakery represents only 8.6% of the total demand for polyols and is thus one of the smallest markets for polyols. With USD xxx mio it is also the smallest market in terms of value. This is due the fact that polyols, even the cheapest ones are expensive in comparison to other basic ingredients used in bakery – flour, sugar, water. The choice for bakery producers is limited to the cheaper polyols such as liquid sorbitol and maltitol, especially for use in low-calorie and sugar-free products where the polyol dosage to replace all the sugar is rather high. For that reason, polyols are often used in combination with fibres as cheaper water binding agents. The main use in bakery is for sorbitol liquid in soft bakery products such as cakes and breads to retain moisture and reduce staling. Crystalline maltitol can be applied in the chocolate part of sugar-free cakes and biscuits.

2.5.1.5

ORAL CARE

Current demand - Global 2011/12

kt	Erythritol	Isomalt	Lactitol	Maltitol liq	Crystalline Maltitol	Mannitol	Sorbitol liq	Sorbitol powder	Xylitol	Total
Europe										
USA										
Other N.America										
South America										
China										
India										
Thailand										
Indonesia										
ROW										
TOTAL										

Forecast demand - Global 2015

kt	Erythritol	Isomalt	Lactitol	Maltitol liq	Crystalline Maltitol	Mannitol	Sorbitol liq	Sorbitol powder	Xylitol	Total
Europe										
USA										
Other N.America										
South America										
China										
India										
Thailand										
Indonesia										
ROW										
TOTAL										

2.5.2.5 *ORAL CARE*

Current value demand - Global 2011/12

Mio USD	Erythritol	Isomalt	Lactitol	Maltitol liq	Crystalline Maltitol	Mannitol	Sorbitol liq	Sorbitol powder	Xylitol	Total
Europe										
USA										
Other N.America										
South America										
China										
India										
Thailand										
Indonesia										
ROW										
TOTAL										

2.5.2.6 *PHARMACEUTICALS*

Current value demand - Global 2011/12

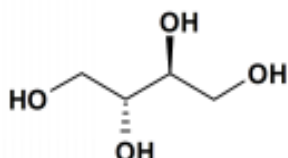
Mio USD	Erythritol	Isomalt	Lactitol	Maltitol liq	Crystalline Maltitol	Mannitol	Sorbitol liq	Sorbitol powder	Xylitol	Total
Europe										
USA										
Other N.America										
South America										
China										
India										
Thailand										
Indonesia										
ROW										
TOTAL										

3. DEFINITIONS

The sugar alcohols are the group of polyhydric alcohols, most of which are commercially obtained by hydrogenation, i.e. reduction of a carbohydrate by hydrogen under the influence of temperature, pressure and catalysts.

3.1. ERYTHRITOL

Structure



Erythritol is a naturally occurring four-carbon sugar alcohol with the chemical name 1,2,3,4 -butanetetrol and the empirical formula C₄H₁₀O₄. It is an optically inactive substance and thus exists in only one form, the meso-form.

Raw Materials / Synthesis

Lichen

Originally erythritol was produced by extraction of arboreal lichen imported from Madagascar. The entire production (UK, 1910–1975) which never exceeded 2 tons per year, was converted into tetranitrate and sold by Wellcome Foundation as a vasodilator. In the early 1970s, some erythritol was claimed to be synthesised from 2-butene-1,4 diol. Pfizer Food Science Group developed a lab-scale fermentation process but it was shelved as newer compounds eclipsed this class of vasodilators.

Glucose Syrup

Today, virtually all erythritol is produced by fermentation using glucose. Also sucrose is used as a raw material, particularly in countries where sucrose is cheaper than glucose, however using a slightly different producing strain adapted to use sucrose as a substrate.

Mitsubishi Kagaku and Nikken Chemical in Japan, jointly developed in 1982 a fermentation based process under the auspices of the National Food Research Institute, using *Aureobasidium* sp. as the strain. A joint production by Nikken and Pfizer never materialised for reasons of cost and early production problems.

First commercial production started in Japan at Nikken Chemical's related facility, Fukui Chemical. In 1998, at the height of the erythritol boom in Japan, at least two production sites are believed to have produced erythritol: Fukui's plant and Rengo, a toll processor chemical company.

5.4. MALTITOL

In 2009 and 2011 respectively, 6 and 3 patents were issued mentioning crystalline maltitol (front page). There are also many more patents where crystalline maltitol is mentioned without being the key innovating compound, mostly in the chewing gum, tableting and pharmaceutical applications area and all are applied for by end-users in this market (McNeil, Adams, Kraft, Wrigley).

Year	Applicant	Patent Number	Description
2011	Danisco	EP2332414	Crystallization of polyol compositions, crystalline polyol composition product and use thereof
2009	Roquette	WO/2009/136056	High fluidity and non-caking pulverulent crystalline maltitol composition
2009	Roquette	EP2093231	Rectangular parallelepipedal maltitol
2009	Roquette	EP2055197	Method for evaporative crystallisation of maltitol
2011	Lotte	WO/2011/007551	Sugar alcohol-containing antibacterial agent for inhibiting proliferation of periodontal disease-causing bacteria
2012	Cargill incorporated	WO/2012/0317720	Solidified sugar alcohol mixture
2012	Sumitomo Chemical	WO/2012/002372	Thermoplastic polymer composition and processing stabilizer

7. USA

7.1. PRODUCTION OVERVIEW

Overview Polyol Producers - USA 2011/12

kt	Erythritol	Isomalt	Lactitol	Maltitol liq	Crystalline Maltitol	Mannitol	Sorbitol liq	Sorbitol powder	Xylitol	Total
ADM										
Cargill										
Dupont										
Danisco										
Ingredion										
Roquette										
Total										

* either partially or completely available from trade

Source: Giract, based on interviews

7.2. TRADE

The following table has been estimated and presented in order to understand the region’s dependence on imports for speciality polyols. In the case the products have been imported by local polyol producers, the volumes have already been listed in the overview table of polyol producers shown above, hence the two tables do not add up exactly to show total availability in the USA market.

About 45% of the imported volumes represented below are by local polyol producers, the remainder is imported by traders and other international polyol producers not active as producers in the USA.

Overview Polyol Imports - USA 2011/12

kt	Erythritol	Isomalt	Lactitol	Maltitol liq.	Crystalline Maltitol	Mannitol	Sorbitol liq	Sorbitol powder	Xylitol	Total
Cargill										
Ingredion										
Palatinit										
Roquette										
Others										
Total										

Source: Giract, based on interviews

The company is located in Yucheng County of Shandong province, the so-called “China Functional Sugar City”, which has abundant corn resources and some other big corn starch processing companies. The main products are grouped in 4 series: polyols, oligosaccharides, starch sweeteners and special syrups. With 500 employees and RMB 266 mio (USD 42 mio) of fixed assets, the company has an annual sales income of RMB 200 mio (USD 32 mio). Bailong’s products are for both domestic and overseas markets. Its important domestic clients include Kangshifu, Mengniu, Yili, Wahaha, Nongfu Spring, Yashili, Tiens, etc. and the client portfolio comprises around 40 companies.

Shandong Biobridge Technology Co., Ltd. (Shandong Jianyu Biotech Co., Ltd.)

Dongfeng Road, Industrial Zone, Dongming, Shandong

Tel: +86 530-6259111

Fax : +86 530-6256555

Main products: xylose (3000 tons/year-crystalline)

Shandong Biobridge Technology Co., Ltd. was founded in 2007 with RMB 10 million (USD 1.6 million) of nominal capital. The factory covers nearly 85 000 sq.m. of land and has 120 employees. The total investment is RMB 50 million (USD 8 million). Biobridge owns a 3kt/year xylose production capacity and supplies xylose to other xylitol producers in China. During the telephone interview, it was confirmed that Shandong Biobridge no longer supplies xylitol.

Shandong Futaste Pharmaceutical Co., Ltd

No. 1266 Shizhong Rd, Yucheng, Shandong 251200

Tel: +86 534-7266356

Fax: +86 534-2125289

Website: www.futaste.com

Main products: xylitol (30 000 tons/year), arabinose, maltitol (15 000 tons/year liquid), sorbitol (30 000 tons/year), mannitol (1 000 tons/year) – Giract was unable to identify any output for mannitol.

Shandong Futaste Pharmaceutical is a modern hi-tech enterprise with combination of technology, industry and trade.

With corn as the raw material, it produces xylose, xylitol, maltitol, sorbitol, dextrose and crystalline fructose. It is planning to invest a further RMB 700 mio to extend total capacity to 600 000 tons/year.

9.6.5.3

*END USER PERCEPTIONS***Hawley & Hazel (BVI) Co., Ltd.**

No.3 Industry Area, Shalang, West District, Zhongshan City, Guangdong 528411

Tel: +86 760-88551339

Fax: +86 760-88550922

<http://www.darlie.com.cn>

Background

This Taiwan-based company was established in 1995 and is located in the West District. Specialising in oral care products, it has built up the Darlie brand which is now well known all over China. It is quality certified for GMP, ISO-9001-2000 and runs in a SAP environment. Toothpaste output is estimated at around 600 mio packages, conferring Hawley & Hazel a 7.5% market share.

Polyol Use

Sorbitol consumption is around 12600 tons, based on an average dosage of 30%. The company indicates that it pays around RMB 3.3-3.5/kg for sorbitol.

The competitive product is glycerin, which is the traditional ingredient. However, the price of glycerin is not competitive.

Guangxi Aqili Stock Co., Ltd

No.28 2nd Rd, Xidi, Wuzhou City, and Guangxi 543002

Tel: +86 774 3863770

Fax: +86 774 3863770

www.aqili.cn

Background

Established in 1945, the company is one of 20 members of the Aqili Group, which runs businesses in the oral care, personal care, home care and fabric care segments. The sales and marketing department is situated in Guangzhou.

It is one of the top 10 toothpaste producers in China. Its success is largely based on its formula which relies on the use of Chinese herbal recipes still favoured by the traditional Chinese. The company was also the first to launch children's toothpaste in China (K-Clean Corn), as well as toothpaste for the middle-aged population (K-Clean Steady). Toothpaste output is about 220 mio packages per annum, an estimated 2.75% market share. The company expects to grow its oral care business by 10% per year and hence the output could be 420 mio packs in 2015.

10.3. PRICES

There exists a huge variation among the prices of sorbitol 70% liquid as compared to other polyols since these are imported. The market prices of various polyols are:

Polyols	Market price (INR/kg)
Sorbitol 70% solution	40
Sorbitol powder	160
Crystalline maltitol	300
Xylitol	400
Erythritol	450
Isomalt	200

Source: Giract, based on interviews

10.4. PRODUCERS

Kasyap Sweeteners

Background

Kasyap Sweeteners company is a producer of starch derivatives that includes sorbitol, liquid glucose, starch, and high maltose corn syrup. Its manufacturing facilities are at Badnawar (Madhya Pradesh), Vapi(Gujarat) and Silvassa (Dadra and Nagar Haveli). The major clients of this company include most of the leading manufacturers like Unilever, Colgate, E Merck, Glaxo, Pfizer, Novartis, Abbott, Kraft Foods, Nestle, Perfetti Van Melle, Amway, P&G and BASF.

Feedback on the company

Kasyap Sweeteners continues with its leadership position in the sorbitol 70% solution market in India with a market share of more than 30%. Maize is used as the raw material for manufacturing Sorbitol.

In 2011 an additional 10kt capacity was added. The company has a currently installed capacity of 80kt for sorbitol and 12kt for liquid glucose. In the year 2011, the production of sorbitol reached around 60kt which is an increase by 30% as compared to 2008.

The major characteristics of sorbitol include retention of moisture, act as a low calorie and anti-cariogenic sweetener. The major end use applications are oral care products (toothpaste), soaps, pharmaceuticals, cosmetics, raw material for Vitamin C and paints.