

Polyols in

SUGAR

FREE and

REDUCED

CALORIE

Foods and
Beverages

Questions & Answers About Polyols or Sugar Replacers

What are polyols?

Polyols are sugar-free sweeteners. Polyols are carbohydrates but they are not sugars. They are used cup-for-cup [volume-for-volume] in the same amount as sugar is used, unlike acesulfame potassium, aspartame, saccharin, and sucralose which are used in very small amounts.

What other names are used for polyols?

Since “polyols” is not a consumer friendly term, many nutritionists and health educators refer to polyols as “sugar replacers” when communicating with consumers. Scientists call them sugar alcohols because part of their structure chemically resembles sugar and part is similar to alcohols. However, these sugar-free sweeteners are neither sugars nor alcohols, as these words are commonly used. Other terms used primarily by scientists are polyhydric alcohols and polyalcohols.

What sugar replacers (polyols) are now used in the U.S.?

Those currently used in foods in the U.S. are erythritol, hydrogenated starch hydrolysates (including maltitol syrups), isomalt, lactitol, maltitol, mannitol, sorbitol and xylitol.

What kinds of products use sugar replacers (polyols) as sweetening ingredients?

In the U.S., they are now used in a wide range of products, including chewing gums, candies, ice cream, baked goods and fruit spreads. They are also used in toothpastes, mouthwashes, breath mints and pharmaceuticals such as cough syrups or drops and throat lozenges.

What other foods sweetened with sugar replacers (polyols) are expected in the future?

Sugar replacers (polyols) function well in fillings and frostings, canned fruits, beverages, yogurt and tabletop sweeteners. Also, some functional foods or nutraceuticals are sweetened with them.

What are their health benefits?

Sugar replacers (polyols) provide fewer calories per gram than does sugar, they do not promote tooth decay and they do not cause sudden increases in blood glucose levels. Because they taste good, people can improve the healthfulness of their diets without having to sacrifice the pleasure of eating sweet foods they enjoy.

Are they safe?

Sugar replacers (polyols) have been used in foods around the world for many years. An Expert Committee of the World Health Organization has carefully reviewed them and concluded that they are safe for human consumption.¹ In the U.S., the Food and Drug Administration (FDA) classifies some as Generally Recognized as Safe (GRAS) and others are approved food additives.

Do they cause gastrointestinal problems?

For the vast majority of consumers, these sweeteners do not cause a problem. In some people, excessive consumption may cause gastrointestinal symptoms, such as gas or laxative effects, similar to reactions to beans and certain high-fiber foods. Such symptoms depend on an individual's sensitivity and the other foods eaten at the same time.

What should a person do if he or she is sensitive?

Gastrointestinal symptoms, if they occur at all, are usually mild and temporary. If a person believes she/he is sensitive, the amount eaten on a single occasion should be reduced. Most people will adapt after a few days, the same way they do to high fiber foods. Many people with diabetes, for example, have learned from their health professional to eat only a small amount of sugar-free products containing polyols at first and then to gradually increase these foods in the diet.

How do their calories compare with sugar?

Sugar provides approximately 4.0 calories per gram. The FDA allows the use of the following caloric values:

3.0 calories per gram	HSH*
2.6 calories per gram	sorbitol
2.4 calories per gram	xylitol
2.1 calories per gram	maltitol
2.0 calories per gram	isomalt
2.0 calories per gram	lactitol
1.6 calories per gram	mannitol
0.2 calories per gram	erythritol

*hydrogenated starch hydrolysates

How do they function differently as ingredients in foods?

Sugar replacers (polyols) usually do not absorb water the way sugar does; therefore, foods made with them do not become sticky on the surface as quickly as do products made with sugar. Molds and bacteria do not grow as well on these sweeteners, as they do on sugar, and so products last longer. When used in medicines, they generally do not react with pharmacologic ingredients as much as sometimes happens with sugar.

Can they be used in foods that are heated or cooked?

Sugar replacers (polyols) generally do not lose their sweetness when they are heated and can be used to flavor hot beverages and in foods that are heated when processed or cooked. However, unlike sugar, they do not usually give a crisp brown surface to foods which are baked.² The non-browning property is an advantage for products for which a change in color is not desired.

How are they used differently in the body?

Sugar replacers (polyols) are slowly and incompletely absorbed from the small intestine into the blood. The portion that is absorbed is metabolized by processes that require little or no insulin. Some of the portion that is not absorbed into the blood is broken down into smaller segments in the large intestine.³

Why do they not cause tooth decay?

Sugar replacers (polyols) are not readily converted to acids by bacteria in the mouth and, therefore, do not promote tooth decay. The FDA has authorized the use of the "does not promote tooth decay" health claim for food products containing erythritol, hydrogenated starch hydrolysates, isomalt, lactitol, maltitol, mannitol, sorbitol, xylitol, or a combination of these. The American Dental Association has adopted a position statement recognizing the role of sugar-free foods and medications in maintaining good oral health.

Are they useful for people with diabetes?

Because these sweeteners have lower caloric values, they may help people with diabetes achieve their weight goals. Non-cariogenic throat lozenges may also be useful if a person's medications cause dryness of the mouth. Sugar replacers (polyols) also cause smaller increases in blood glucose and insulin levels than do sugars and other carbohydrates. Therefore, snacks sweetened with them may be useful. People with diabetes should consult their physician or other health professional about the usefulness of sugar replacers (polyols) in their daily meal plan.

How should they be calculated in exchange lists for meal planning?

Experts in diabetes management advise that if less than 10 grams of sugar replacers (polyols) is consumed, that serving is considered a "free food." Above 10 grams, subtract half of the grams of sugar replacers (polyols) from the grams of total carbohydrate and then calculate the exchanges.

Where is information about sugar replacers (polyols) found on the food label?

The name of the polyol appears in the ingredient list. The words "sugar alcohol" or the specific name of the polyol may also appear in the Nutrition Facts panel.

When are they included in the Nutrition Facts panel?

The grams in a serving may be shown voluntarily. If a claim such as "sugar free" is made on the label, the polyol content must be shown in the Nutrition Facts panel. FDA regulations specify that the name of the specific polyol may appear in the Nutrition Facts Panel if only one polyol is in the food. If more than one is in the food, the term "sugar alcohols" must be used. FDA is considering whether the term "polyol" would be less confusing to consumers than "sugar alcohol."

Why are they used in combination with other sweeteners?

Sweetness varies among the sugar replacers (polyols) and depends in part on the products in which they are used. They vary in sweetness from about half as sweet as the same amount of sugar to equally as sweet as sugar. Sometimes combining sugar replacers (polyols) gives a more pleasant taste.

Sugar replacers (polyols) are frequently combined with other alternative sweeteners, such as acesulfame potassium, aspartame, saccharin and sucralose, in sugar-free chewing gums, candies, frozen desserts and baked goods. The sugar replacer (polyol) gives these foods mild sweetness as well as the bulk and texture of sugar; the other alternative sweeteners bring the sweetness up to the level consumers expect.



Calorie Control Council

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TECHNICAL NOTES

1. The Joint Food and Agriculture Organization/World Health Organization Expert Committee on Food Additives (JECFA).
2. Sugar replacers (polyols) do not participate in the Maillard reaction.
3. A significant amount of the unabsorbed sugar replacer (polyol) is metabolized to short chain fatty acids and gases by bacteria in the large intestine. Absorbed sugar replacers (polyols) are generally metabolized by insulin-independent mechanisms.