soda is a generic term for carbonated beverages dispensed from fountains or sold in bottles or cans. Depending on the region, these are also known as soft drinks, soda pop, fizzy drinks, or tonic, or called by brand names such as those of the three leaders: Coke, Pepsi, or Dr Pepper. All sodas are carbonated, sweetened, and flavored, features that distinguish them from noncarbonated energy and sports drinks, juice drinks, and flavored waters.

Carbonated water and sweeteners are the most important ingredients. Sodas are sweetened with sugars (regular soda) or artificial chemicals (diet soda). The other ingredients—sodium, caffeine, organic acids, coloring agents, and flavor additives—are present in amounts too small to have much effect on nutrition or health. A typical 12-ounce cola, for example, contains only 30 milligrams of sodium and 35 milligrams of caffeine, low in comparison to other sources. The flavor additives are deeply guarded trade secrets, but include fruit and herbal extracts. The acids and flavors help to counteract the otherwise overwhelming sweetness of these drinks.

Regular Sodas

A 12-ounce regular soda typically contains 40 grams of sugars—the equivalent of *ten* teaspoons. Sodas are, in effect, systems for rapid delivery of large amounts of sugars into the blood stream. The sugars are glucose and fructose, derived from high-fructose corn syrup (HFCS) or, occasionally, cane and beet sugar (sucrose). See CORN SYRUP; FRUCTOSE; and GLUCOSE. Until 1984, American sodas were largely sweetened with cane or beet sugar. But these are more expensive than HFCS because of quotas, tariffs, and corn subsidies. When taste tests proved that consumers could not tell the difference between sodas made with sucrose or HFCS, companies switched to the cheaper alternative. In some cane-growing countries, such as Mexico, sodas are still sweetened with sucrose but increasingly diluted with the less-expensive HFCS. Because some European countries grow sugar beets, and former colony trading partners grow sugarcane, the European Union continues to favor sucrose.

Sugars account for all of the 150 calories in a 12-ounce drink. As the size of drinks increases, the sugars increase, and so do the calories. A vending machine's 20-ounce bottle provides about 250 calories from its 16 teaspoons of sugars. A movie theater's 64-ounce "Double-Gulp" could, in theory, contain as much as 54 teaspoons of sugars and 800 calories, but it is typically poured over ice. The more ice, the less sugar and, therefore, calories.

Less sugar is desirable because the sugars are almost entirely responsible for the health effects of sodas. Sugary drinks contribute to poor diets, weight gain, and obesity-related conditions such as type 2 diabetes, heart disease, and stroke. Sugars provide no nutrients; their calories are "empty." Worse, the sugars come in liquid form and constitute "liquid candy." Preliminary research in animals suggests that consuming sugars as liquids rather than in solid foods bypasses regulatory systems that control appetite and food intake. Studies of human eating behavior support this idea: sodas encourage people to consume more calories from other foods. Sugar alone does not have this effect; people eating jelly beans compensate for candy calories. Neither do liquids necessarily; soups help people lose weight. These observations explain current dietary advice to "drink few or no regular sodas" as a means to reduce intake of sugar and its nutritionally empty calories. See SUGAR AND HEALTH.

Sodas would not be a health concern if people did not drink so many of them. But in America, sodas together with energy and sports drinks are the fourth leading contributor to adult calorie intake, and the third for children. These drinks account for 36 percent of added sugars in American diets, and sodas alone provide twice as much sugar as is recommended for daily diets. Dietary surveys find half the population to maintain that they consume no sodas at all, meaning that the other half must drink much more. Five percent of the population admits to drinking at least 48 ounces a day. Men drink nearly twice as much soda as women, especially when they

are single. The highest intakes are reported by boys ages 12 to 19, and people who are from the South, black, Hispanic, or of low income. Even children ages 2 to 5 drink an average of 6 ounces a day. Soda use declines with education, income, and age, which makes it an indicator of low social status and low income—characteristics most associated with high rates of obesity and related health conditions. The one hopeful sign is that soda consumption in the United States has been declining since the late 1990s, as health-conscious Americans increasingly turn to less sugary sports drinks, teas, diet drinks, and bottled water.

The industry reports that American companies produced 30 gallons of regular carbonated sodas per capita in 2012, down from 41 gallons in 1998. Because inventory is tightly controlled, the industry says that virtually all the soda it produces is purchased. If we assume that all purchased soda is consumed, these figures translate to a per capita intake of 320 12-ounce servings per year, down from 437 per capita in 1998. The difference between slightly less and slightly more than one serving a day may not appear serious, but the industry views the decline as a crisis.

To expand sales, soda companies have moved their marketing overseas. On a worldwide basis, the industry produced 194 billion liters of regular sodas in 2012. For the 7 billion people in the world, this works out to 78 12-ounce servings per capita per year. The range of consumption is large, from less than ten a year in some countries in Asia and Africa, to more than one a day in Mexico and Argentina. Soda companies view high-population countries such as China, India, and Indonesia as prime markets for expansion. Public health experts predict that an increase in obesity prevalence is sure to follow.

Diet Sodas

Diet sodas contain no or little sugar and provide no calories. Instead, they are artificially sweetened with aspartame, acesulfame K, sucralose, Stevia, or other nonnutritive chemicals. See ARTIFICIAL SWEETENERS and STEVIA. Even though there is little evidence to support the idea that diet drinks help with weight loss or maintenance, they account for 30 percent of soda sales in America. Their most frequent drinkers are older, white, married, and well-educated females. Sales of diet drinks are also declining in America as a result of concerns about their slightly bitter aftertaste and unnatural sweeteners. On a worldwide basis, diet drinks comprise 12 percent of soda sales, but the percentages vary widely, from 3 percent or below in Asian countries to as much as 35 percent in Australia.

Are Sodas Addictive?

Soft drinks include caffeine as well as sugars. Addiction researchers note that even small amounts of caffeine make people feel more alert, energetic, and cheerful and can induce symptoms of dependence in susceptible individuals. In laboratory animals and in some people, caffeine and sugars independently encourage habitual daily use and induce symptoms of dependence and withdrawal. It remains an open question whether sugars and caffeine, alone or together, are addictive in the usual sense—inducing cravings, an inability to stop the craving, and intense discomfort when the craved substance is unavailable. Addictive or not, health advice to consume sodas only in moderation makes good sense. See ADDICTION.

See also SODA FOUNTAIN.

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