

PROPERTIES AND USES

Properties of cane sugars:

Sugar consists mainly of sucrose and to a certain extent of glucose and fructose. Thus properties of sugars are listed below:

(A) Physical properties

Property	
Taste	Sweet
Crystal	Mono-clinic
Solubility	Very soluble in cold water and dilute alcohol. Solubility increases with increase in temperature. It is insoluble in chloroform, ether and glycerine.
Specific gravity at 20°C	1.05917
Optical activity	Dextro-rotatory

(B) Chemical properties

Property	
Action of heat	Perfectly dry sugar can be heated to 160°C without decomposition. It then melts forming a non-crystallizing substance. In the presence of moisture it decomposes at 100°C, becoming a caramel and liberating water. On further heating changes to CO ₂ and formic acid.
Action of heat on dilute solutions	By prolonged heating at the boiling point the dissolved sucrose slowly combines with water and breaks up into glucose and fructose.

Uses:

All sugars from whatever source are used almost entirely for food. In the United States, only 1% of sugar consumed is used for nonfood purposes. Technology exists to convert sucrose into many other substances by fermentation, esterification, hydrogenation, alkaline degradation, and many others, but the price is prohibitive. In 1981, the value of sugar as a food was 2-4 times its value as a chemical feedstock. As a food, sugar is all energy, and even brown and raw sugar contains virtually no protein, minerals or vitamins.

The per capita consumption of sugar is an indicator of degree of economic advancement of a country. Apparently, human nature is such that one of the first uses of income above the subsistence level is to satisfy the sweet tooth. The consumption of

sugar in all forms, beet, cane, and corn, in Western Europe and North America is approximately the same, 60 kg per person each year, and holding steady. However, eastern countries consume much less sugar, and the poorer third-world countries, much less. In some isolated and remote areas, the figure is less than one kg per person-year. The world average is about 20 kg per person each year and increasing. In the United States, there is a shift toward more use of corn sugar and less of cane and beet sugar because of price, but this applies only in areas where starch is in great surplus.

The Importance of Sugar in the Diet of Man:

As everybody should know, man cannot live without a certain minimum level of sugar in his blood, the diabetic providing a good example of what happens when the blood sugar is not converted into energy, as should be the case in a healthy body. Before the discovery that insulin is essential for normal body function, a person with a defective pancreas (where the hormone, insulin, is formed) would have a short, or very short, life span, depending on the severity of his condition. Such a person was diabetic; his blood sugar was constantly very high, because only a small proportion of it was converted into energy, and his body reaction was therefore the same as that of a healthy person with a low level of blood sugar. He was always hungry, and also thirsty because of the high osmotic pressure in the blood stream, and since the sugar did not 'burn' as it normally does, it was treated by the body as foreign matter and was expelled by the kidneys. As the malfunction became worse, he would slowly starve to death, commonly at a young age.

Let it be remembered, therefore, that sugar is absolutely necessary, and if not eaten as such, it must be made from other carbohydrates which exists in food; but since sugar is the lowest in calorific value of all carbohydrates in an ordinary diet, as well as the cheapest, it should be used liberally, but wisely.