



Sugars are a rich **source of energy**. That is why they are among the most important nutrients for human beings. Sugars are produced in green plants via **photosynthesis** which requires *carbon dioxide* (from the air) and *water* (from the soil).

Classification :

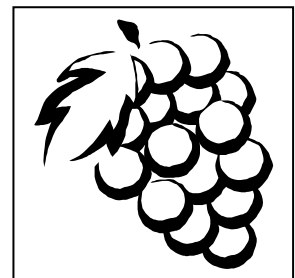
simple sugars (<i>monosaccharides</i>)	,double sugars' (<i>disaccharides</i>)	complex sugars (<i>polysaccharides</i>)
glucose (grape sugar/dextrose), fructose (fruit sugar)	saccharose (beet sugar), maltose (malt sugar)	starch, cellulose

glucose: occurs *in grapes*, in *sweet fruit* and in *honey*. Blood contains about 0.1% of glucose; the disorder interfering with sugar balance in blood is known as diabetes.

In foodstuff glucose is often used as *syrup* (sweets, creamy chocolate 'Nougat', candied fruit)

Ascorbic acid (vitamin C) is made from glucose.

In medicine, *infusions* of glucose solution are used for artificial feeding and states of exhaustion.



fructose: very similar to glucose; occurs in *very sweet fruit* and in *honey*.

saccharose: commonly known as *crystal sugar* or *cube sugar*; is produced from *sugar beet*.

maltose: is formed during the *breakdown of starch*; important for the production of *beer*; compare *malt sugar*!

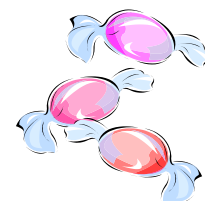
starch: many glucose molecules form one *giant molecule* of starch. Starch occurs in *grain*, *rice*, *potatoes*, *flour*, *bread*.

cellulose: composed of many glucose molecules; Cellulose is an important skeletal substance in plants (cotton, vegetables) and roughage (fibre) in nutrition.

Breakdown (decomposition) of starch



starch → malt sugar → grape sugar



cellulose / cotton wool
fructose saccharose
starch / flour maltose
glucose

Experiments

E 1: Taste the types of sugars handed out and write the names down in a sequence (from the least sweet to the sweetest sugar).

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Heat some *glucose*, *saccharose*, *starch* and *sweetener* on a magnesia trough. What does it smell like? _____

E 2: Testing for simple sugars by heating with *Fehling's solution*.

Mix equal amounts of the two reagents *Fehling's solutions I* and *II* and add some *glucose*. Heat solution at 80° C (water bath) for about three minutes. Repeat the procedure with *starch* and *sweetener*.

observation:

test 1 (glucose) _____

test 2 (saccharose/ sweetener) _____

test 3 (starch) _____

E 3: 'silver mirror reaction'

In a dry test tube put some silver nitrate (AgNO_3) and add a few drops of ammonia. Then pour some glucose solution into the same test tube. **Do not shake!**

Pass the test tube through the flame of the burner. **AVOID heating to the BOIL!**

observation:

E 4: Testing for starch with a solution of iodine: 'iodine colour reaction'

Put some drops of iodine solution on foods containing starch (flour, bread, rice, potatoes).

observation:

What's the difference in the way that a *raw potato* and a *cooked potato* react to the test above? Try to explain that difference!

E 5: Enzymatic splitting of starch by saliva:

Chew a piece of roll as long as possible. Take some of the mush, add *Fehling's solution I* and *II* and heat carefully!

observation:

