# *Chemical Synthesis of a Breakfast*

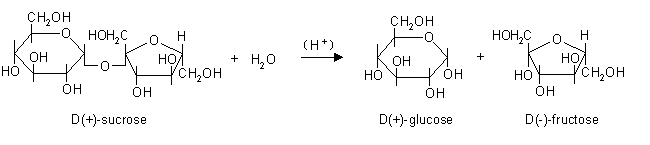


*Since we are working with food, contact with any equipment for chemicals has to be avoided. Clean your bench and cover it with some old newspapers. Use only the provided equipment.*

**Equipment:** bunsen burner, ceramic hob (on tripod), aluminium foil, glass stirring rod (clean first!), coffee spoon, glass beakers, plastic beakers, hotplate, old newspapers.

**Chemicals:** saccharose (=sucrose =beet sugar =”ordinary sugar”), sodium hydrogen carbonate (baking soda) [E500], citric acid [E330], tartaric acid [E334]

## 1. Artificial honey



Hydrolysis breaks the glycosidic bond converting sucrose into glucose and fructose. Hydrolysis is, however, so slow that solutions of sucrose can sit for years with negligible change. If the enzyme sucrase is added, however, the reaction will proceed rapidly. Hydrolysis can also be accelerated with acids, such as tartaric acid or lemon juice, both weak acids. Likewise, gastric acidity converts sucrose to glucose and fructose during digestion.

## Procedure

To 35g of saccharose 13ml of tab water and 0.8g of tartaric acid are added. Keep the mixture at around 90°C for as long as possible (until all other experiments are finished). Stir regularly. An amber coloured artificial honey will form. At the end, add some sodium hydroxide solution to neutralise some of the acid.

## 2. Caramel

Out of aluminium foil craft a small pan. Place it on the ceramic hob over the bunsen burner. Put in a coffee spoon of sugar. Stirring continuously, heat it carefully on a small flame. Shortly before it reaches an amber colour take it off the flame and pour it onto a small piece of aluminium foil. Let it cool down before tasting. Avoid chewing it as it can break your teeth.

**Observation:**

## 3. Sparkling powder: when candies explode

Basically, we do the same as in experiment 2. But instead of just sugar, a mixture of 3 coffee spoons of sugar, 1½ coffee spoons of citric acid and 1 spoon of sodium hydrogen carbonate is put into a newly made pan. Heat this up even more carefully, stirring very thoroughly until it starts to stick together and turns slightly brown. Take it off the flame immediately and, on a small piece of aluminium foil, divide it into small candies.

## Making margarine

**Equipment:** glass beaker 150ml (rinse first!), glass stirring rod (clean first!), glass beaker 400ml with an ice/water mixture

**Chemicals:** coconut oil, cooking oil, milk, 1 egg yolk, NaCl, ice

**Procedure:**

One student has to separate an egg into white and yolk. The yolk is mixed with 5 tablespoons of water and can be used by all groups.

In a clean glass beaker measure up 15g of coconut oil and melt it on the hot plate. You can do this alongside the honey. Then add 3 tablespoons of cooking oil and put it on ice. Stirring constantly add a tablespoon of milk and one tablespoon of diluted egg yolk. Add some salt and mix until it becomes hard. Let it rest on ice.

**Enjoy!**