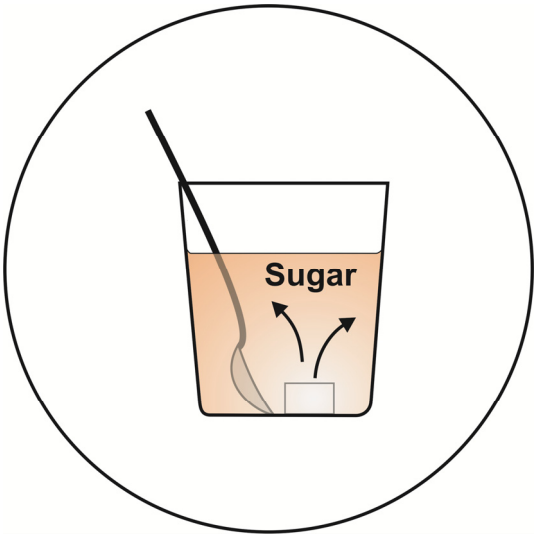
Dissolution of a Sugar Cube



Equipment:

tea glass
glass beaker
plate

"Chemicals":

sugar cubes
water
food coloring

Procedure:

It is known from everyday life that a sugar cube dissolves in a tea glass, even when it is not touched.
The process can be demonstrated more impressively as follows:
The beaker is filled with some water and then a little bit of food coloring is added. A tower of sugar cubes is stacked on the plate. Subsequently, one pours a thin layer of colored water onto the plate.

Observation:

The water immediately begins to move up the tower of sugar cubes and make it collapse after a short while.

Explanation:

The chemical drive for dissolving cane sugar (saccharose) in water (more exactly: in a solution which already contains 1 kmol m^{-3} of sugar, which is about 340 g per liter!) results in:

$$C_{12}H_{22}O_{11}|s \rightarrow C_{12}H_{22}O_{11}|w$$

$\mu^{\ominus}$: –1558 > –1565 kG

⇨ chemical drive $\mathcal{A}^{\ominus}$: +7 kG

$\mathcal{A}^{\ominus} > 0$ means that the sugar dissolves by itself even in such a concentrated solution. Consequently, sugar is highly soluble in water.