Determination of melting peaks of sugar solutions by DSC

Introduction:

The melting point of a sugar solution is an important characteristic in the syrup and ice cream manufacturing processes. It depends on the concentration of sugar in the solution following the phase diagram of sucrose in water.

Experimental:

Samples:

Five edible solutions mainly composed of sugar and water at different concentrations from 26.5% up to 54%.

DSC 131 evo experimental conditions:

Atmosphere: Nitrogen N_2 , atmospheric pressure.

Sample mass: about 12 mg in a 100 µl Aluminum closed crucible.

Experimental procedure: Isotherm at -40℃ during 10 min, heating from -40 to +20℃ at 2℃/min and isotherm at +20℃ during 5 min.

Instruments:

DSC 131
-170℃ up to 700℃

Results:

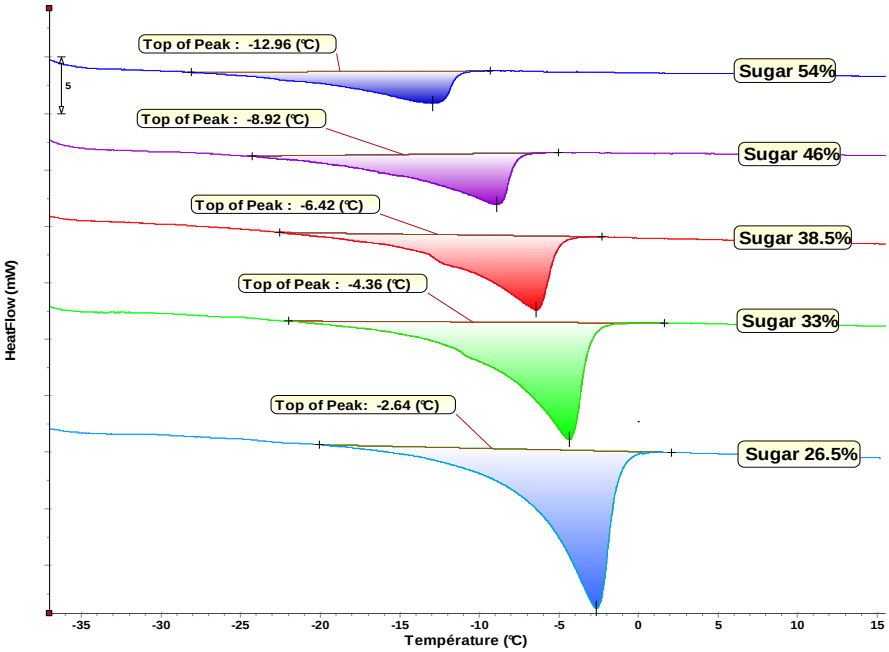

Figure 1: thermogram of water / sugar solution

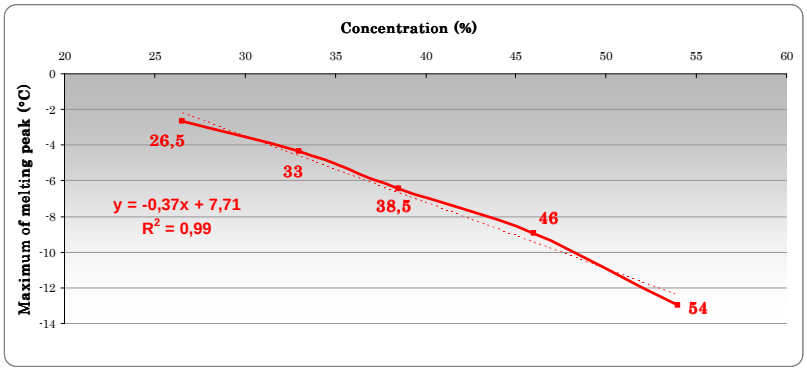

Figure 2: Top of melting peaks depending on the concentration

On the thermograms, an endotherm corresponding to the melting peak of the solution is observed.
When the concentration of the solution increases then the temperature of the top of the peak decreases. This effect follows a linear function in the field of concentrations studied. Thus, this method provides an excellent way to control the concentration of sugar in this kind of solutions.