Drying mangoes

Mangoes are a sweet, edible fruit of a tree that grows in many tropical countries. Mangoes can be dried to enable them to be stored for long periods of time.

Traditionally, mangoes are dried by slicing them into strips and leaving them in the sun. Water from the mangoes evaporates into the air. The sugars and other substances in the cells of the mango fruit stay inside them. This means that dried mangoes taste even sweeter than fresh ones.

An even better method of drying mangoes is to use osmosis. The pieces of mango are immersed in a concentrated sugar solution. Water moves out of the mango cells by osmosis. This method of drying does not expose the mangoes to such high temperatures as sun drying. The mangoes lose about 30% of their mass when they are dried in this way.

Scientists have found that the best conditions in which to dry mangoes by osmosis are to use a 65% sugar solution, a temperature of 35 °C, mangoes sliced into 5 mm pieces and to leave them in the solution for six hours.

1 Explain, using your own words, why mangoes that have been dried by leaving them in the sun taste sweeter than fresh mangoes. (Use the word ‘concentration’ in your answer.)

 …………………………………………………………………………………………………………………………………………………………………

 ………………………………………………………………………………………………………………………………………………………………...

 ……………………………………………………………………………………………………………………………………………….………………..

2 Explain why water moves out of the mango pieces when they are immersed in a 65% sugar solution.

 …………………………………………………………………………………………………………………………………….…………………………..

 ……………………………………………………………………………………………………………………………….………………………………..

 …………………………………………………………………………………………………………………………….…………………………………..

 …………………………………………………………………………………………………………………….…………………………………………..

 ………………………………………………………………………………………………………………………………………………………………..

 ………………………………………………………………………………………………………………………………………………………………..

 ……………………………………………………………………………………………………………………………………..………………………..

3 Suggest why the mangoes need to be left in the sugar solution for six hours, in order to achieve the best results.

 …………………………………………………………………………………………………………………………………………………………………

 ………………………………………………………………………………………………………………………………….……………………………..

 …………………………………………………………………………………………………………………….…………………………………………..

4 Explain why this process works best when the mangoes are sliced into pieces 5 mm thick, rather than left whole.

 ………………………………………………………………………………………………………………………………………………………………..

 ………………………………………………………………………………………………………………………………………………………………..

 ………………………………………………………………………………………………………………………………………………………………..

5 In the spaces below, draw and label what you think a cell from a fresh mango, and a cell from a dried mango might look like. Remember that these are cells from a fruit, not a leaf, and that they do not photosynthesise.

**Cell from a fresh mango Cell from a dried mango**

6 Dried mango slices can be used in cooking. When the mango pieces are put into water, they swell up. This happens faster in warm water than in cold water.

 a Explain why the mango slices swell up when placed in water.

 …………………………………………………………………………………………………………………………………………………………

 …………………………………………………………………………………………………………………………………….……………………

 …………………………………………………………………………………………………………………………….……………………………

 b Explain why the mango slices swell up faster in warm water than in cold water.

 …………………………………………………………………………………………………………………………………..………………………

 ……………………………………………………………………………………………………………………………………………………………

 ……………………………………………………………………………………………………………………………………………………………