

Food Microscopy

(An Annotated Bibliography)

PART IIF. MAJOR INGREDIENTS: SUGARS

G. W. WHITE AND MISS A. J. SHENTON

Lyons Central Laboratories, 149 Hammersmith Road, London W14 0QU

The different sugars met with in food microscopy include glucose, fructose, lactose and sucrose, and mixtures of these as they occur in natural products such as honey and sugar and in manufactured products, such as treacle and confectioners' glucose.

Considerable microscopical work has been done on honey, and the floral and geographical source(s) can often be identified by pollen analysis; the occurrence of pollen grains from plants not native to the U.K. may indicate an imported honey. The microscope has been much used to study the refining process in sugar manufacture from sugar cane and sugar beet and as a quality control instrument in the factory. In background research, many micro-studies have been made to investigate crystallisation from pure sucrose and lactose solutions, and from solutions of mixed sugars. Microscopy has also been used to investigate the factors controlling crystallisation, including supersaturation, impurities and additives, temperature and mechanical agitation. The types of products manufactured include the various liquid sugars, and a wide range of particulate sugars including the brown sugars, white sugars (granulated, caster and icing), spray-dried sugars and freeze-dried sugars. Considerable use is made of the microscope in the particle size analysis of sugars, and especially interesting are the new free-flowing icing sugars with a narrow particle size range of 50-60 μm .

The refractive indices of sugar solutions have been very accurately measured by refractometry, and these values are of interest when sugar solutions are used as mountants. Sugar crystallisation in thin films has received much attention and somewhat different crystal habits have been observed under the microscope, depending on the conditions employed. The optical crystallography of sugars such as glucose, α and β lactose, and sucrose has been studied and the principal refractive indices reported; sucrose hydrates which sometimes appear as white deposits in frozen fruit and concentrates have also been separated and characterised by their optical properties. Finally, it is noted that some sugars (e.g. glucose, lactose, maltose) can be distinguished from each other by forming their osazones, which have a characteristic micro-crystalline structure.

A selection of references, covering these various aspects of sugar microscopy is given below.

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