STARCH (AS. *stearc*, strong, stiff). A form of carbohydrate (see CARBOHYDRATES), occurring as stored food in all plants. Its composition corresponds to the empirical formula $C_6H_{10}O_5$, but its molecular formula, and, of course, its constitution, are as yet doubtful. The number of atoms in its molecule is probably very large. As ordinarily obtained, starch consists of minute uncrystallizable granules insoluble in water. However, when starch is acted upon by hot water, the outer coats of the granules are ruptured and their contents form a viscous liquid that is usually referred to as starch paste and that turns to a firm solid on cooling. Several methods have been described by which ordinary starch can be transformed into soluble starch. Both starch paste and soluble starch give an intense blue coloration with iodine, a reaction exhibited by no other known substance; the composition of the blue starch-iodine compound is not definitely known. Starch is largely used as a food and for laundry purposes; it is used industrially for dressing cloth, for sizing cotton goods and paper, for making dextrin (q.v.) and British gum, etc. The processes employed in the manufacture of starch vary with the source as well as with the use to which the starch is to be applied. The simplest process is involved in making starch from potatoes: here the potatoes are simply reduced to a pulp, and the latter is washed with water in fine sieves, which allow the starch granules to pass through, while the cellulose of the potatoes is held back.

Starch is formed as a condensation product from sugar by the action of certain specialized portions of the protoplasm of plant cells. The typical starch formers are leucoplasts (q.v.), which occur in all cells where starch is permanently stored. But the chloroplasts of the leaves may form starch when the green cells become overloaded with sugar. Thus leaves are often found to contain large quantities of starch, especially at the end of a long period of bright illumination. The sugar formed by the process of photosynthesis (q.v.) is constantly diffusing away into other parts of the plant, but during periods of bright light it is formed more rapidly than it can diffuse, and it is then condensed by the chloroplasts to form starch. During periods of darkness or of weak illumination, when the photosynthetic process ceases or lags, the starch of leaves is reconverted into sugar by the enzyme diastase (q.v.), and then diffuses to other regions of the plant. Thus leaves seldom contain starch in the morning or on cloudy days. But by far the greater part of the starch found in any plant is organized into grains by leucoplasts. By the action of these bodies, sugar which comes from the green leaves is condensed or polymerized into starch. Starch is thus formed in all parts of plants, being especially plentiful in tubers, in thickened roots, and in the endosperm and embryo of seeds. See ALCOHOL; DEXTRIN.