

The skin of plums or prunes must be punctured, and in the case of figs a gelatinous layer under the skin must be broken or they will never dry at any temperature, but will cook and turn color.

In the case of semi-liquids, pastes or slimes, the time varies considerably according to whether they are in suspension or solution. Anything in the nature of a glucoside usually dries quite slowly.

A delicate vegetable fibre will sometimes scorch or toast at comparatively low temperatures in contact with metal or in the presence of CO_2 gas, while in pure air it will stand a much higher temperature without any scorching. Foods may be cooked in moving hot air without radiant heat, but to toast or brown them, requires CO_2 gas in the hot air supplied.

Milk or eggs desiccated at 120 to 150 deg. on a drum, are not dried uniformly and in many cases a 2 per cent solution of acetic acid or formaldehyde is added to preserve them; at higher temperatures they cook when dried this way. But when atomized into air at even 300 deg. fahr., they dry in one or two seconds to a powder of absolute uniformity which requires no preservative and which will a year afterward readily dissolve in ice water, in a few moments.

Hay, alfalfa, pine grass and clover, when dried in 20 minutes at 300 deg. in moving air, keep their original color and odor and have lost all ferments.

Copra (dried coconut meat), dried slowly at 150 deg. or less, retains oleic acid and ferments and will slime and mould in moist hot air, while if dried at high temperature in rapidly moving air (155 to 200 deg. fahr.) loses its ferments, contains about 3/10 of 1 per cent of oleic acid, 69 per cent of highest grade Cochin oil instead of 59 per cent, and will not slime. It will keep at least one year (as we have proven) without deterioration, and maggots and copra bugs will not touch it. Any one who has once smelled rancid copra will appreciate what this means.

Acetic acid vaporized and superheated to 1022 deg. fahr. (the temperature of dissociation of the steam) will condense at the discharge side of the system as acetone, the CO_2 escaping.

Asphalt japan coatings raised from 250 to 400 deg. fahr. will give up the petrolene, residuum oil or other vehicle, and harden in 2 to 3 hours.

Starch dried at 180 deg., moistened with diatase or dilute acid and raised to 400 deg., will in 8 hours turn to dextrine and at higher temperatures to dextrose.

Anthracene and creosote oil compounds bake to form electric insulation articles in 8 to 10 hours, while the lighter compounds, as coatings on paper and cloth, bake at about 300 deg. in a few moments.

Nitrites are made with air at 500 to 600 deg.

The drying of insulation blocks of asbestos, magnesia, and kieselguhr or diatomaceous earth in sheets, 4 in. thick, takes weeks at low temperatures and with radiant heat, and requires days at higher temperatures with direct flame, gas heat; but with hot air at high velocity at 600 to 800 deg. fahr. they dry in 8 hours.

In the dehydration or desiccation of some fruits and vegetables the oxidation of the contained enzymes or unorganized ferments, discolors the product so that peaches and apples turn brown and potatoes black. This does not in the least hurt the product but the people do not like the looks, so it is then treated with fumes of burning sulphur or other bleach-

ing agent, the discoloration is entirely removed and the product has a complexion as glaring and artificial as that of some of the women who buy it. In taste, however, it is unsatisfactory. Sulphur dioxide was never intended for human food.

Dr. Harvey W. Wiley, authority on pure foods, says: "Sulphur fumes, as I discovered in my experimental work with young men, are highly deleterious to health and should be excluded from objects of human food."

In the case of some vegetable fibres which give up the contained water very reluctantly, if the sulphur treatment is given prior to drying, the sulphur dioxide seems to take up some water and forms sulphurous acid which attacks the fibre and causes it to give up the remaining water quite readily, thus materially reducing the time of drying. Whether there remains a trace of the acid after drying, I do not know.

When the pure food laws are extended and enforced to prevent the sale of sulphur treated dried foods, there will be a large field for the production of wholesome desiccated fruits and vegetables. I am told that 80 per cent of the fresh fruit crop and 40 per cent of the fresh vegetable crop in this country are annually wasted.

DESIGN OF HIGH TEMPERATURE INSTALLATIONS

In installing high temperature plants each installation is distinctive and controlled by numerous controlling conditions. The plant is laid out for a maximum of speed or output, and to attain this presupposes all governing conditions to be favorable. The size, weight, shape and disposition of the material in the oven, and the proportion of free space have an effect on the result.

The specific gravity and thickness of a coating, and the method of mixing a coating or a compound have an effect, and sometimes a small variation in the composition or in the quality or purity of one element will prevent proper results, and above all, the human equation has to be considered. A certain firm worked up a material which had to be dried in slabs. The laboratory samples dried uniformly and within the desired time limits in the drier, at a certain temperature. When it was tried on a commercial scale, half of each batch refused to dry properly and the other half did not have all the properties of the samples. The measures or gauges for the different elements were checked and found to be exact. The elements were analyzed and found to be of a standard. Finally a watch was put on the man at the mixer.

Of all the elements which entered the compound, two were vital as they together formed the binder, which of course should be distributed evenly throughout the mass. He was putting them in separately at opposite ends of the mixer, running the machine forward for a few moments and then backward for the same time. The results were that these two ingredients never became intermixed. By putting these elements into the center of the mixer together, the block dried perfectly with all the characteristics of the laboratory samples. Several people lost considerable sleep, however, before the trouble was discovered.