

absolute certainty; yet in other cases he has failed, without being able to find a reason for a failure. He would also say, that others must have found the same difficulties, or, most assuredly, the "Sucrate of Lime process" would have, by this time, displaced all others—so simple is it, and so effectual when it is successful. The writer recommends all who may enter on the manufacture of beet sugar to try it on every opportunity; and, if possible to bring it to perfection, and establish the process as a certainty. When this is done, they will need no other.

The following description is abridged from the Report of the Commissioner of Agriculture of the United States:—

The mode of forming the "sucrate" is as follows:—After the ordinary juice is obtained by any of the foregoing processes, and has been properly defecated with lime, it is evaporated until it attains a gravity of from 30 to 32° Baumé (i. e. about as thick as ordinary maple molasses), it is left to cool. It is upon this cold juice that sucration is effected, for as the sucrate of lime dissolves in a hot liquid it is necessary to act on the syrup cold.

The sucrating vessel is of cast iron, circular, furnished with a lid traversed by a pinion or arbor, with spokes or pallets, and a hopper, worked by rack work, to allow the lime to fall in scattered shape and in proper quantity, into the syrup, while the latter is agitated with the pallets. This hastens the combination of the lime with the sugar. The quicklime has been slacked with a small quantity of water beforehand, so as to bring it into the shape of a fine dry powder. By the agitation, crystals form and agglutinate, and the mass heats somewhat, the grains of sucrate, increase in size, become more dense, and by constant stirring, fall to the bottom in masses; and if the agitation is continued long enough, the whole liquid would become a solid mass; before however this point is reached, and when only half of the liquid is sucrated in the vessel, the sucrate formed is removed, is placed on a sieve and drained and dried, the other half of the liquid which remains in the vessel is strengthened by adding new and cold syrup of 30° to 32° Baumé, and half sucration is again effected as above; this is repeated up to the last batch of the days work. When the last batch is sucrated completely—as this last operation contains all the saline matters of the whole liquids united—it is set aside as impure sugar, and treated separately.

The sucrate thus obtained may be dried still further in the air, until it loses from twenty-seven to thirty percent of its weight,

when it will be found to contain, in one hundred parts, seventy parts of sugar, twenty of lime and ten of water. This substance may be washed in cold water, and thus be greatly purified, and it may then be put up in boxes or bags, without fear of its undergoing any change. It is neither affected by time or insects, and for all practical purposes, is imperishable.

The apparatus necessary for a manufactory of this kind (in addition to the ordinary machinery for rasping or diffusion), and which will work up nine to fourteen millions of pounds of beet root, is two large defecating vessels of sheet iron, two evaporating basins, and the sucrating vessel as described, with the necessary sieves and strainers.

This sucrate of lime may be made in the winter and stored by for summer employment. When it is to be reduced into sugar, it is dissolved in hot water and carbonated; the lime, as a carbonate and inert, now settles out of the purified syrup, and is removed by filtration and the ordinary filter presses.

This process of Rousseau promises to produce a revolution in the manufacture of sugar from the beet. Rousseau has also invented a new animal black, to be used in the place of bone black. He says that he proved to his own satisfaction that the decolorizing property of bone black lies entirely in the nitrogenized portions of the bones, and that bone charcoal made without these nitrogenized portions will not decolor. (In this, however, most authorities differ from him.) In his new black he replaced the phosphate of the bones with clay, which he calcined with twenty-five per cent. of horse manure, or even with night-soil—although this, of course, would never be used in practice—and thus obtained a most energetic and concentrated "animal black," and this at so cheap a rate that it is cheaper and easier to make new black than to restore the used black by re-burning. The spent black forms most valuable manure. By the use of this new black the filtrations are reduced one-half, and the expense of this part of the process is greatly lessened, which is a most important point.

If he is correct in his statements, the best and cheapest animal matter to mix with the clay would be the "graves," or refuse of the soap and candle manufacturer, or scraps and trimmings of hides from the tanner. Whatever animal substance is used is, of course, thoroughly purified and deodorized by the burning at a red heat with clay.

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