

could be obtained experimentally by heating comminuted wood under pressure using dilute sulphurous acid and at the same time maintaining a moisture ratio even below the saturation limit. This matter of low moisture ratio represents the essential point upon which the success of this business has so far hinged. To illustrate this, let us consider what would result, assuming that an acid concentration of 1 per cent is to be used and in one case that we have a moisture ratio of 100 per cent and in the other a moisture ratio of 400 per cent. Under these conditions the total acid consumption in the second case would be four times, and the amount of heat used something in excess of three times that in the former. Since the acid must subsequently be neutralized the lime required for this purpose will bear a similarly increased ratio. When the reaction is completed, although the yields may for the sake of argument be identical, the sugars formed will be correspondingly diluted and probably require in the second case some concentration before being used. These points all represent direct economy without which the business could not have progressed, but apart from this there are other factors involved of equal, if not greater importance.

The reaction itself is one requiring extremely careful control, especially in connection with temperature and time conditions. This being the case the less water present the more quickly can temperature regulation be effected and upon such rapid control largely depends the yield which may result.

To all of this may be added the fact that with the 100 per cent moisture ratio the resulting product is still below the saturation limit and represents a material with which it is not at all difficult to deal. In this regard it can be handled in conveyors like the original sawdust and the sugars can be extracted by diffusion just the same as in the beet sugar process. On the other hand with a high moisture ratio the solids quickly settle down into a felt-like mass which nothing short of an hydraulic jet is likely to move.

Such success as has accrued is directly attributable to an appreciation of the full importance of the above factors, without which commercial results could not have been obtained. In addition to this the application of rational engineering methods to accomplish the various operations involved has been all that has been required. Classen's failure to establish his process commercially in the United States was principally due to the latter.

In 1909 while conducting the operations of an experimental plant, the construction of which I initiated, for the purpose of demonstrating that my deductions in regard to the above were sound as well as that the engineering adaptations which I proposed were feasible, I discovered that hydrochloric acid and sulphuric acid could apparently both be employed with similarly low moisture ratios and similar success.