making a perfect joint, which apparently leads to the hypo-Copper chlorite attacking the iron casing at the joints. alloys are also attacked by the hypochlorite. Mr. Jordan therefore advises the use of wrought or cast iron pipes, and the renewal of these pipes from time to time. This advice is open to criticism./ If iron is unsuitable for tanks, still less is it suitable for pipes. On the other hand, if lead is not affected, it would be possible to use lead pipes for small installations and for large installations, concrete pipes could be used, no doubt; but better still would it be in all probability to use an ordinary cast-iron pipe well coated with Dr. Angus Smith's solution. Mr. Jordan advises that in orifice boxes the orifice should be placed at the side, and not at the bottom as is customary, the reason being that "lint and strings from storage sacks, or pieces of wool from barrels, and insoluble matter from the chemical itself tend to shut off the orifice at the bottom of the tank. Why such matters as lint, string and wood cannot be kept out of the solution, mixed otherwise with the greatest care and accuracy, is puzzling. Surely these are masses of organic matter which must seriously upset the strength of the hypochlorite solution.

We are told that the amount of hypochlorite required depends to some extent upon the hardness of the water, the taste of chlorine being more apparent in soft water than in hard. Also that, if there is any oxidizable matter in the water, such as ferreous carbonate or various organic compounds, it is necessary that enough hypochlorite be used to oxidize these before disinfecting action is obtained. It is difficult to make this statement agree with what has been said elsewhere, or even with the author's following statement, for he immediately proceeds to tell us that it is not clear what proportion of organic matter present in water may remain unoxidized and sterilization be effected, and he advises the addition of hypochlorite to waters before filtration under certain conditions with sand filters. It is remarkable how very undecided the American chemists appear to be on the point in question. They seem to have some reason for thinking that it is desirable to add hypochlorite to water while it still contains a good deal of organic matter before filtration, but their reason is certainly not at all clear. In a paper dealt with recently in these pages one of the limitations of the hypochlorite process was stated to be its inability to remove organic matter appreciably from water. Yet it is equally clear and undisputed that the amount of organic matter present in the water decides the quantity of hypochlorite, and that where there is no organic matter present the amount of sterilizing agent required to remove bacteria is infinitesimal.

The explanation is probably to be found in the fact that if hypochlorite is mixed with water containing organic matter, and is then passed rapidly through a filter, the organic matters are removed by the filter before they have killed the hypochlorite, though they must reduce its efficiency, and what remains of the hypochlorite is sufficient to kill the coli and other bacteria present in the water, because the organic matters have been removed; what the advantage may be in thus using up the hypochlorite or organic matter present in the water or in the body of the filter is unknown.

Mr. Jordan advises the application of hypochlorite to water before filtration in the case of sand filters in order to prevent growths in the filter, and he seems to advise the reverse in the case of mechanical filters, also to prevent growths on the sand layer. With regard to the sand filter we are told "where there is such a proportion of organic matter that serious growths would be produced in the sand laver, it is without question advisable to apply the hypochlorite before filtration," and with regard to mechanical filters that, "should Vates, Jr., S. D. Biggar, F. F. Treleaven.

the application be made long enough before the water reaches the filters to insure the completion of all sterilizing action, the application of such sterile water to the filter may, under certain conditions, encourage growths on the sand layer." Also we are told that if the sterilizing goes on while the water is passing through the filter, there will be necessarily a dislodgment of growths, which will be passed into the filtered water with an increase of bacterial content.

The idea that the treated water passing through the slow sand filter will so effect it that growths will be prevented, but that in passing through a mechanical filter it will encourage growths in the sand layer, does not seem to be reasonable. The sand filter must of necessity intercept unoxidized organic matter, and this must accumulate in the filter, otherwise for what purpose is the filter used? If all the organic matter were consumed by the action of the hypochlorite, and the filter itself were sterilized, the application of sterile water might encourage growths quite as much in a slow sand filter as in a mechanical filter, though why a sterile water containing hypochlorite should encourage growths is not explained.

Mr. Jordan dwells upon the need for thoroughness in mixing, and gives an instance where on account of irregular mixing some of the city water had an unpleasant taste, and some had not. It might also be argued that some of the water was therefore over-dosed, and some was some was sterile and under-dosed, and that some was not. It cannot be said that the American authorities have as yet displayed their wonted ingenuity with regard to mixing and dosing arrangements. While our engineers have perfected various appliances for the economical preparation of hypochlorite for dosing, mixing and dechlorinating, we still hear of very crude appliances being used in America, and the reason appears to be that the chemist is acting in the capacity of engineer. The reports and papers coming daily to hand from America display ignorance of practical engineering facts on the part of the chemists, who seem to have a free hand in doing purely engineering work. The result is contradictory results and irregular working, and sometimes failure in the application of scientific theories, which are quite correct in principle, but are badly carried out.

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