Rideal, sodium hypochlorite, with 12 per cent. available chlorine, was employed, and gave striking results. The treatment was commenced in June, 1910, and has been employed ever since with small intervals for experiments. By experiment it was found that 1 part of chlorine to 2,000,000 parts of water rendered the water practically sterile, without a trace of chlorine being evident on testing by means of starch and potassium iodide. When the treated water is examined in quantities of 3 c.c., organisms are usually absent, although at times there may be as many as 12 organisms per c.c. present. But the striking result is in the B. coli content. Repeated examinations have shown B. coli to be absent in 250 c.c. of water, and in a few examinations made of 500 c.c. a negative result has been obtained; the water may therefore be considered a safe water even for drinking purposes. As to the presence of chlorine in the treated water, no complaints have been made since the first few days of the experiments, when 1 part of chlorine in 1,000,000 parts of water was added, and then it was detected by the starch and iodide test; but daily testings for free chlorine, from July 11, 1910, to December 6, 1911, gave consistently negative results.

In this country there is some prejudice against the addition of chemicals to water for the purpose of purification, and it may be appropriate to consider at this point whether any alumina passes through the filters into the general supply. Delépine found no excess of alumina in the treated water over the untreated. Molyneux, at Stockport, found a film on the bottom of the service reservoir, which has a storage capacity of twenty-four hours, and through which 400,000,000 gallons of water had passed in the eighteen months before being inspected.

At Shrewsbury the service reservoir, with a capacity of slightly over 250,000 gallons, was found, after a year, to have a film of brownish flocculent material of a thickness of ½ in. over the bottom. This film was found to be composed chiefly of hydrate of alumina and iron, derived, presumably, from the coagulant added. The capacity of the reservoir allows an average rest of five hours for the treated water before reaching the consumer, and gives sufficient time for sedimentation; but when one considers that over 400,000,000 gallons of water passed through the reservoir in twelve months, the small amount of deposit may be considered negligible. Repeated tests of the filtered water as supplied to the consumer have failed to show the presence of alumina, so that it may be accepted that if alumina does pass through the filter at times, its amount is negligible from the physiological aspect.

Merits of Mechanical Filters and Slow Sand Filters.—There is ample evidence that, under ordinary circumstances and with careful supervision, the slow sand filter is slightly more efficient in reducing the number of bacteria present in the raw water. The reduction, however, varies just as with the mechanical filter in accordance with the amount of care devoted to the management of the filtering process. Even with careful management the results with the sand filter may not come up to one's expectations. Houston states that the slow sand filter removes 98 per cent. of the bacteria, but at Bolton a comparison of the results of slow sand filters and mechanical filters dealing with the same water showed a percentage purification of 88.8 for the former and 95.6 for the latter.

For the removal of suspended particles, coloring matter, iron in solution, or plumbo-solvent action from a water derived from a source free from human pollution, the mechanical filter appears to be the filter of choice. But, given a water polluted, or suspected of being polluted, without sufficient storage of raw water, or without sterilization of the treated water, the slow sand filter gives a slightly greater measure of safety. Mechanical filtration combined with storage, however, can be depended upon to give a water which can be considered satisfactory from a public health standpoint. Whether sterilization of a polluted water can be depended on under all circumstances remains to be proved. So far it has not had a sufficient trial.

In tropical countries, and in active warfare, mechanical filters, combined with a sterilization process, seems the best method of coping with the difficult conditions.

Further advantages of the mechanical process over slow sand filtration are less capital cost, variously estimated at one-third to one-half that of slow sand filters; economy of space; working under cover; ease of management and cleansing; no interference of supply during cleansing; and less cost of maintenance. Ross and Race have estimated the maintenance charges in connection with a slow sand filter, and with mechanical filters of two types dealing with the same water. They found that the cost per 1,000,000 gallons of water treated by sand filtration was 12s. 11d., and by the mechanical filters 9s. 8d. and 9s. 7d. respectively. These observers give the capital cost of the filters per 1,000,000 gallons of water filtered as £7,989 10s. for the sand filters, and £3,623 4s. and £3,458 4s. respectively for the two types of mechanical filters—Bell's and Mather & Platt's—and the yearly cost per 1,000,000 gallons of £1 13s. 3d., £1 3s. 7d. and £1 2s. 10d., calculating on the loan periods allowed by the Local Government Board. Delépine quotes Dixon, who gives the cost of dealing with 1,000,000 gallons of water by means of Mather & Platt's filters as 9s. 5d. for treatment and maintenance, and an annual cost of 14s. for one installation, and 14s. 8½d. per 1,000,000 gallons for a second installation, taking the annual charges on capital on a forty years' loan basis.

Mechanical filtration, therefore, possesses considerable advantages over slow sand filtration, the chief being the lower capital outlay and the lower maintenance cost. Taking into account the efficiency of these filters, along with the economy in their installation and management, I believe that slow sand filters will be superseded in many cases where formerly they were considered absolutely essential.

SCOTTISH ROAD TESTS.

Road tests are being made in Scotland with eight forms of construction, of a nature which might apply to a very large area of the Scottish roads—covering practically all the county roads. They are:—

(1) Ordinary water-bound macadam.

(2) Ordinary water-bound macadam, surface-sealed with distilled tar.

(3) Macadam, 3 in. thick, grouted with a mixture of pitch and sand.

(4) Macadam, 3 in. thick, grouted with pitch alone.

(5) Macadam, 3 in. thick, grouted with a mixture of Trinidad asphalt and distilled tar.

(6) Ordinary tar-macadam—i.e., tarred whinstone metal surface-sealed with distilled tar.

(7) Tar-macadam—i.e., whinstone metal with a binding mixture of asphalt and distilled tar.

(8) Ordinary tar-macadam, surface-sealed with a prepared bituminous mixture.

The roads selected are what may be termed "main" or "through" county roads. They average about 18 ft. in width.

The Intercolonial Railway is asking for tenders for 1,000 steel box cars and 20 locomotives. Part of the rolling stock of the road has had to be loaned to the Transcontinental.