pletely ionized, the conductivity method has been proposed as a rapid way of estimating the inorganic solids. Certain German sanitarians who have experimented with this process, have stated that the mineral matter is directly proportional to the conductivity, and found that the factor c was approximately 0.7. The factor $c = m/e$, m being the mineral matter in parts per million, and e being the electrical conductivity in reciprocal megohms.

The writer has determined the value of c for a number of surface and subsurface waters of the Ottawa district, and some of the results are plotted in the accompanying diagram. A number of the results have not been plotted because they would have crowded the sketch too much in one spot. Most of these were of the Ottawa River at various stages and are so close together that there seemed to be no object in plotting them, considering the purpose of the diagram. A few other results not plotted were of saline waters which gave results far outside the limits of the diagram. These saline waters are extreme cases which are very rarely encountered.

It will be seen that c is by no means constant, and although the average of seventy determinations gave a value of 0.65, the variations from the mean are very considerable and invalidate the accuracy of the process as an indirect one for estimating the mineral content of water.

A similar result could be predicated from a consideration of the theoretical principles involved. The specific conductivity of an aqueous solution of an electrolyte is determined by three factors, viz., the concentration; the electrolytic dissociation; and the mobility of the ions.

The concentration is the predominating factor, but the nature of the dissolved substances also exerts an appreciable influence. Chlorides, sulphates and nitrates are practically dissociated completely when present in amounts up to 1,000 parts per million, but the dissociation of carbonate of lime commences to fall at a much lower concentration. At 100 parts per million the value of c for chalk is 0.40, but at 500 p.p.m. it is 0.47.

The conductivity is a function of the concentration of the ions, and also of their mobility, which is determined by the nature, the hydrogen ion being much more mobile than those of Na, K, Mg, Ca, Cl, SO_3, and NO_3, which also have different ionic velocities under a constant potential gradient.

The conductivity results are of value, however, in the classification of the source of supply, and frequent examinations of well waters have shown that there is often a correlation between the bacteriological purity and changes in the electrical conductivity. Deep wells, of great purity, have given a remarkably constant conductivity, whilst wells showing intermittent pollution have given varying conductivities. One well in Ottawa yields a water of good quality when the conductivity is about 2,000 units, and shows excessive pollution at 200 units. These results point to contamination with surface water, which gains access through a faulty casing pipe.

Wells yielding two different classes of water have been noted. One well, when the consumption is normal, supplies a chalk water having a conductivity of about 700 units; when the draft is very heavy, a saline water with a conductivity of 20,000 to 25,000 units is obtained.

Examination of Distilled Water

As absolutely pure distilled water is a very poor conductor of electricity, the conductivity method is very suitable for its examination. By employing special precautions, distilled water can be prepared having a conduction of less than one unit, but the ordinary product made in laboratories will be found to have a conductivity of from three to five units. After storage in soft glass bottles, the value is usually much higher, and conductivities of thirty and over in samples obtained from pharmacists do not necessarily indicate inferior methods of preparation. A value of six should be regarded as the maximum for freshly-prepared distilled water, and if higher values are obtained, the still should be carefully examined for leakages.

CHLORINATION*

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LESS than ten years ago hypochlorite of lime was used for the first time on a large scale for the disinfection of a water supply. Previous to that it had been used in large quantities to prevent the spread of typhoid fever from polluted water supplies, but no attempt had been made to so treat a polluted water that disease-producing organisms would be eliminated and yet the water would remain unchanged in taste and odor.

In these ten years, the use of chlorine compounds in sanitary science has grown tremendously. As would be expected, because of such a rapid growth, the use of these substances has come into bad repute in some instances. Sometimes this has been due to the fact that over-zealous people expected more of the treatment than could be accomplished, and sometimes it has been because water companies or departments attempted to accomplish with chlorine compounds, work which called for clarification in conjunction with disinfection. Things have adjusted themselves very satisfactorily by this time and filtration has its place, decolorization its place, iron removal its place, chlorination its place, and so on. Some problems require for solution a combination of several methods of purification.

It was in 1908 that the epoch-making work was done at the Bubbly Creek filtration plant at the Chicago Union Stock Yards by Geo. A. Johnson, using hypochlorite of lime, in conjunction with a rapid sand filtration plant, to make potable a grossly polluted water. Previous to this it had been considered sufficient to remove 97% of the bacteria by purification processes.

Since that time, however, filtration plants in nearly every instance use chlorine compounds as a finishing treatment. By the process of filtration, bacteria are removed mechanically. An average of 97% to 98% of the total bacteria can be removed by this process. Chlorine compounds are used as a finishing treatment because they seemingly have a selective action for the organisms that cause disease. The quantities required are very small. Every new filtration plant that is modern will be found to be equipped with a liquid chlorine apparatus for sterilizing the filtered water.

Whereas hypochlorite of lime was formerly used entirely for the disinfection of water and sewage, now it has been almost entirely replaced by liquid chlorine treatment. The reasons for this are many. Hypochlorite of lime, or "hypo," is a loose compound of lime and chlorine gas; in other words, the lime serves as a carrier for the chlorine gas. Moisture and carbonic acid in the air cause this loose compound to deteriorate by giving off chlorine. Shipment is made in wood and sheet iron drums, which

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*Paper read at annual convention of the Southwestern Waterworks Association, April, 1918.