The use of liquor calcis chlorinatae for the preparation of eusol has another advantage in that the available chlorine in the liquor can easily be determined by titration with N/10 sodium arsenite solution. The testing of the strength of the hypochlorous acid is particularly desirable when it is to be used for intravenous injection.

Standard eusol is a solution of which

- 1 c.cm. = 1 c.cm. N/10 sodium arsenite.
- = 0.0035 gram chlorine.
- = 0.0026 gram hypochlorous acid.

The following is an example of the application of the test where the chloride of lime is of poor quality.

Take 10 c.cm. of the liquor calcis chlorinatae; dilute to 100 c.cm. 10 c.cm. of this solution = say 0.74 c.cm. N/10 sodium arsenite solution; the end point of the reaction being determined by potassium iodide starch solution or paper. From this a simple calculation shows that 135 c.cm. of liquor calcis chlorinatae per litre is needed to give the standard eusol. When bleaching powder of high quality is used about 125 c.cm. will be found sufficient.

Sodium arsenite solution is more convenient for testing than sodium thiosulphate. Pure arsenious acid can be obtained easily, and the solution keeps indefinitely. The result is not affected by the presence of chlorates. The following method of preparing the solution is described by Cumming and Kay, and we are indebted to these authors for permission to include the description of their method in this paper.

Weigh out accurately in a small porcelain basin 1.237 grams of pure arsenious oxide (previously dried in a desiccator); add 10 c.cm. of sodium hydroxide solution (twice normal), and warm the basin on the steam bath, stirring the mixture gently until the oxide dissolves (about five minutes). Transfer the solution and the rinsings of the basin to a 250 c.cm. standard flask and add 20 c.cm. of dilute hydrochloric acid (twice normal); then add about 8 grams of sodium bicarbonate (or 100 c.cm. of a cold saturated solution), and dilute the solution to the graduation mark.—*A Text-book of Quantitative Chemical Analysis*, by Cumming and Kay. Second edition, p. 94.

Since liquor calcis chlorinatae deteriorates so slowly, a large amount of a standardized stock solution may be made at one time. Each litre of the liquor yields at least 7 litres of eusol. Further, if the test be once applied it need not be repeated till the stock has been exhausted.

REFERENCE.

¹ BRITISH MEDICAL JOURNAL, July 24th, 1915.

A NOTE ON THE CARREL-DAKIN-DAUFRESNE TREATMENT.

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THE results of six months' experience of the Carrel-Dakin-Daufresne treatment in infected wounds in a general hospital, British Expeditionary Force, may be of interest. It was carried out strictly in accordance with the system employed by Carrel at his hospital. The solution, the operative technique, the appropriate number, calibre, and position in the wound of the tubes are of prime importance; indeed, the number of perforations and their size are not negligible.

The Solution.—The Dakin-Daufresne solution is rich in hypochlorite of soda, but must be neutral or alkaline. It must be tested at least every two days for free hypochlorous acid and the sample rejected if any acid be present. The solution is prepared so readily from abundant and cheap chemicals that free use or rejection is of no importance, and the method of preparation is rapid and free from technical difficulties.

Operative Technique.—Whenever possible, the wound should be converted into a broad-based crater and all damaged tissue detritus and free fragments of bone removed.

Haemostasis is most important, by ligature pressure and hot water. It is faulty technique to introduce the irrigation tubes into an oozing wound. The tubes must be inserted first into the depths and recesses, then more superficially. The tubes are made stable by fragments of one-inch web bandage removed from Dakin-Daufresne solution and arranged lightly in contact with the distal extremities of the irrigation tubes. The irrigation tubes (4 mm. calibre and 30 cm. long) are tied at the distal end

with linen thread. Perforations extend from this point for 5 cm., 10 cm., or 15 cm. along the length of the tube, so as to vary with the dimensions of the wound treated. I usually employ an open tube—that is, one not occluded by tying—for the disinfection of medullary cavities.

The Results.—The cases have in general required a longer period of treatment to secure disinfection than is the rule at Carrel's special hospitals. This is to be attributed to the later stage at which the British cases come under treatment. During the first twenty-four hours after infection of a wound smears show no microbes, although these are present in the retained foreign body—shell, clothing, etc.—from the beginning. Carrel receives and treats his cases during this aseptic period, thereby securing a more rapid disinfection process. Five days appears to be the shortest period of disinfection. This factor of delay must be kept in mind when comparing results. The majority of the cases treated by this method at this general hospital were grave wounds of the extremities with compound comminuted fractures of the long bones, often multiple, and frequently with considerable loss of substance.

Since the inception of Carrel's treatment we have found:

1. Absence of secondary haemorrhage.
2. Absence of amputations except in two classes of wounds—namely, infected wounds of the knee-joint with much bony comminution, and badly comminuted ankle-joints.
3. Septicaemia—one case.
4. Mortality—one; a very dirty comminuted knee-joint.

I may say, in conclusion, that the appearance of the patients is very striking. A clear complexion and good appetite is the rule. This immediate change in the facies of the ward gave us all—I include the nursing staff—confidence in the method long before we were justified by the accumulation of results.

THE CARREL-DAKIN TREATMENT AND A METHOD FOR ITS APPLICATION ON AN EXTENSIVE SCALE.

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In applying the Carrel-Dakin treatment of wounds it was found necessary that the apparatus used should be obtainable at a minimum cost, and that the labour necessary for the satisfactory carrying out of the original method should be reduced by some means.

For the individual or separate treatment of cases, a bottle (Fig. 1) was devised to replace the ampoules and apparatus recommended by Carrel in his book.

The bottle is hung upside down on a stand or prop, which can be moved to the most convenient place about the side of the bed, and is filled by means of a funnel attached to the glass tube A. The glass tube C is cut short to the rubber cork and is the means of communication with the air; the glass tube B conducts the fluid in the bottle to the wound by rubber tubing fixed with a clip. On the bottle is marked a scale in half-ounces. Every two hours when the wound is flushed, say with two ounces of fluid, the clip on the rubber tubing is released until the column of fluid in the bottle is decreased two ounces (or any other amount found necessary) by the scale.

FIG. 1.—Requirements: A wooden stand, a 1lb. bottle with a narrow neck, a rubber stopper (No. 5) bored with three holes, glass tubing 5 mm. in diameter, rubber tubing, one clip and one funnel.