

THE CHEMISTRY OF THE PREPARATION OF DAKIN'S NEW ANTISEPTIC.

By C. C. Wagner.

The search for the perfect antiseptic began in the time of Lister. He was the first to employ such methods in surgery. From his time to the present, the search has been continuous, and has covered a very wide range. The ingenuity and pure applied chemistry employed in keeping up this search, is vastly interesting.

For example, it has long been known that chlorine possessed very desirable antiseptic properties. Certain types of chlorine solutions were in use as early as the Crimean War, namely: the Labaraques solution, but with very little promise for its continuance.

Then came the great war in Europe, and with it an almost unbelievable demand for antiseptic preparations. The response to the demand came in the form of Dakin's solution, which is very little other than a highly dilute solution of calcium hypochlorite or common bleaching powder, to which was added one or more of the following: H_3BO_3 , $NaHCO_3$, $HgCl_2$ or $NaCl$ in varying proportions. This was reputed to be very wonderful and the most complete antiseptic yet devised. However, it was found to be very irritating to the skin, and required drainage and complete change every hour. This made it costly in way of help, dressings and time, requiring almost constant watching of the patient.

Dakin then began a personal research on the problem of skin irritation. The type of action of the various hypochlorite solutions, in liberating free chlorine on greatly infected wounds with no irritating effects, but on healthy skin produced reactions to such a degree that it was necessary to protect the skin surfaces, or to abandon chlorine producing antiseptics.

Dakin's personal investigations found that the hypochlorites liberating chlorine in the presence of any kind of proteid, produced as the first reaction, chloramin compounds, or products containing the NCl group. These products which belong to the chloramin family, possess distinct

and absolute bactericidal properties and are thus the real germicidal agents produced when hypochlorites are placed in contact with flesh. The chloramines are non-irritating to animal cells, either within or without the wound.

The problem thus presented was the synthetic preparation of chloramin compounds for the extensive hospital demands of Europe.

Dichloramin T came by the process known as the Carrel-Dakin-Dehelly-DePage technique, which is as follows:

Four or five hundred grams of calcium hypochlorite are added to two or three liters of water and shaken for half an hour. The supernatant liquid is siphoned off and the rest filtered. About 75g of powdered chlorazene or toluene para sulphon amid is then added to the solution and shaken till dissolved. Filter again if not clear. Then the solution is acidified by slow addition of 100 cc. acetic acid, which produces the Dichloramin T or toluene para sulphonidichloramin. Next about 100 cc. of chloroform are added which dissolves crystals and is drawn off from a separatory funnel. Spontaneous evaporation liberates the crop of crystals. The crystals, however, are not applied in this form, but in a solution of chlorinated paraffin oil and chlorinated Eucalyptol. For this 500 cc. of paraffin oil are treated with 15g $KClO_3$ and HCl and allowed to stand 24 hours in light, producing in all likelihood a mixture of chlorine substitution products of the paraffins.

The oil is then washed with water and $NaCl$ and water to get rid of the excess of HCl . Then powdered C is added to remove any uncombined chlorine. It is allowed to stand over $CaCl_2$ for 12 hours and filtered by suction.

The Eucalyptol is prepared in much the same way. 500g of Eucalyptol are taken and treated with HCl and $KClO_3$ for 12 hours. The oil is well washed with water and Na_2CO_3 solution. Dry Na_2CO_3 is added and allowed to stand 24 hours. It is then filtered and dried with calcium chloride. 15% of Dichloramin T crystals are added to the chlorinated Eucalyptol, in which form it is stable for about thirty days. Then at the time of use, the Eucalyptol solu-

tion is diluted with enough paraffin oil to make the strength of the mixture about $2\frac{1}{2}$ to 5% Dichloramin T.

From the enthusiastic praise given this antiseptic by both the military physician and the man in civil practice, it may be regarded as a great benefit to mankind.