TABLE II.

SHOWING THE NUMBER OF MILS OF SOME VOLATILE OILS SOLUBLE IN 100 MILS OF ALCOHOL OF VARIOUS CONCENTRATIONS.

Alcohol. Percent.	Anise.	Cinnamon	Clove.	Eugenol.	Peppermint.	Sassafras.
30	0.05	....	0.02	...	0.02	0.07
40	0.08	....	0.10	0.30	0.02	0.10
50	0.10	0.20	0.40	5.80	0.03	0.20
60	0.25	0.40	2.00	16.00	0.06	1.30
65	0.80	1.10	10.00	...	0.07	2.30
70	1.50	2.20	21.75	...	0.10	4.00
75	4.00	7.00	...	...	0.17	7.00
80	7.50	....	...	...	0.35	11.00

ABSTRACT OF DISCUSSION.

In response to a question by C. E. Caspari, Dr. Wood stated that as an antiseptic, Oil of Clove was more efficient than eugenol. Answering Mr. Scoville, relative to effect of temperature on solubility, the author replied, that there was a marked difference in solubilities of oils at different temperatures. The temperatures were not accurately observed, however, within two degrees; the tests were made at temperatures between 22–25° C.

H. C. Hamilton asked relative to methods used in the germicidal tests, and results obtained. Dr. Wood replied that this work had not proceeded far enough to give definite figures, only seven oils had been determined. The phenol coefficient of oil of cinnamon is about 12, cloves about 18, eucalyptol about 1. Oil of sassafras stands very high as an antiseptic, in dilutions of from 1000 to 7000 it inhibits the growth of all organisms tested. Oil of clove is effective in dilutions of about 1000 to 6000; oil of cinnamon about the same; oil of peppermint is comparatively feeble and oil of lemon has practically no effect. The oils can be grouped, but there is a marked difference in the individual volatile oils relative to their antiseptic value.

E. H. Grant thought that different solubility results would have been obtained if the tests had been started with 70% alcohol instead of 93% alcohol. Higher results would probably have been obtained.

EXPERIENCES IN THE MANUFACTURE AND STANDARDIZATION OF DAKIN'S SOLUTION.

BY A. J. SELLS.

The early months of my services in the army were spent with Base Hospital No. 50, as bacteriologist and chemist, and in such capacity I found that the Army method for the preparation of Dakin's solution was at fault because of the materials furnished.

After a preliminary training of three months at Camp Fremont, California, the unit left for France and arrived at Mesves-Bulcy Hospital Center on August 6, 1918. This hospital center was located about one hundred and fifty miles south of Paris and was the largest hospital center in the world.

As our unit was designated a surgical unit by the Army, at least one-half of the cases were surgical and the remainder medical. These surgical cases called for a large quantity of Dakin's solution each day.

The Army method for the preparation of Dakin's solution was as follows:

Sodium carbonate (dry)	140 grammes
Calcium hypochlorite (25 percent Cl)	200 grammes
Boric acid	40 grammes
Water	8 liters

The sodium carbonate was dissolved in the water, then the calcium hypochlorite was added. The whole was thoroughly agitated and allowed to stand for about one-half hour for the calcium carbonate to settle out. Then the supernatant liquid was filtered, standardized in the usual manner, and finally neutralized with the boric acid.

This method proved satisfactory in every detail provided the materials were of the best. Then all that was necessary was to follow directions and no trouble was experienced.

However, a great deal of trouble was experienced due principally to the poor quality of calcium hypochlorite received by our medical supply. Whether it was due to negligence on the part of the medical authorities or to the untrained enlisted men handling the material I cannot say, but the fact remains that of all the lots of calcium hypochlorite received, not a single one was found which analyzed above 20 percent of available chlorine and many lots were as low as 15 percent of available chlorine. As the above formula called for at least 25 percent, a solution of the required strength could not be obtained by the above method. This proved to be a serious condition as in many cases life or death depended solely on the efficiency of this solution.

Being confronted by this difficulty I set out in the hope of producing a solution as efficient as the original with the materials at hand. First, I increased the percentage of calcium hypochlorite so that the available chlorine content would be as great as from a sample giving 25 percent of available chlorine. This I found by analyses of each lot of bleaching powder received. Such a modification proved to be as bad as in the first case as the patients complained of burning and irritation. On further examination I found that the solution contained too much caustic soda which was formed by the interaction of the sodium carbonate and the free calcium hydroxide in the bleaching powder. Now the Army formula proved to be deficient in the percentage of boric acid added.

My next step was to increase the percentage of boric acid added so that the solution was slightly more than neutralized. In this manner no further complaints were registered by the patients and the solution proved very efficient.

Embodying all the foregoing points the Army formula was revised to read as follows:

Sodium carbonate	140 grammes
Calcium hypochlorite (25 percent)	200 grammes
Boric acid	Quantity sufficient
Water	8 liters

The sodium carbonate was dissolved in the water, then the bleaching powder calculated on the basis of 25 percent of available chlorine was added and the whole thoroughly agitated. After standing for one-half hour the clear solution was filtered and titrated for strength of sodium hypochlorite.

The method of standardization was as follows:

Place 10 Cc. of solution in a flask, add 10 Cc. of a 10 percent solution of potassium iodide and 2 Cc. of glacial acetic acid. The free iodine liberated was titrated with tenth-normal sodium thiosulphate until the solution was decolorized. Each cubic centimeter of tenth-normal sodium thiosulphate used multiplied by 0.03723 gave the number of grammes of sodium hypochlorite present in the solution. I always added less water than the required amount and diluted it afterwards so that the strength would be 0.48 percent of sodium hypochlorite. After dilution the solution was again titrated so as to have a check on the dilution calculation.

The solution was now diluted to the required strength and completed with the exception of the neutralization of the solution by boric acid. This was accomplished by adding the boric acid in small portions until the solution was just neutralized. An aqueous suspension of phenolphthalein was used as indicator. When the solution was just neutralized, 2 grammes more of boric acid was added to each liter of the finished solution. The reason for this excess acid is to take care of the small amount of sodium hydroxide liberated when the solution comes in contact with the tissues. If more than 4 grammes of boric acid in excess of neutralization are present in each liter of the solution it will prove irritating. I found that 2 grammes of boric acid in excess worked satisfactorily.

During the months of November and December of 1918, twenty-five gallons of this solution were used each day. It proved to be, by far, the best solution in use for the sterilization of wounds.

When the solution was prepared according to the above modifications not a single complaint was registered by the patients, and the results were most encouraging, which was proven by the bacterial counts taken every other morning as wound controls.

Whether other hospitals experienced this same difficulty I am not able to state, but the fact is, the Army formula with the poor quality of bleaching powder received was absolutely worthless and if it had been continued would have resulted in a much greater loss of life than was actually experienced.

ABSTRACT OF DISCUSSION.

H. A. B. Dunning called attention to the very satisfactory method of preparing Dakin's solution by passing chlorine gas into a solution of sodium carbonate and bicarbonate, then standardizing carefully by the usual iodometric method, and testing for alkalinity with the newer sensitive indicators, as well as observing the phenolphthalein flash.

Ivor Griffith stated that the wane of the popularity of the solution could be ascribed to the fact that the organic chlorine compounds, such as dichloramine-T and chloramine-T, replaced it in some conditions, and also that civil practice, other than in hospitals, did not allow of its proper use.

CONCENTRATED MILK PRODUCTS.*

BY J. W. ENGLAND.

CONDENSED MILK.

Condensed milk is an evaporated milk representing about two and a half times its volume of fresh milk and containing about 40 percent by weight of cane sugar. It is of thick syrupy consistency and very sweet taste, and is marketed in cans. Commercially, it is made by dissolving cane sugar in fresh milk by a warming pan, after which it is drawn into the vacuum pan, where it is condensed at a temperature of 120° to 130° F. until the volume of liquid is 40 percent or less of the original volume; if the milk be overheated, the albumin will be coagulated and the sugar caramelized. After condensation, the milk is drawn off into cooling cans and constantly stirred in a sanitary room and atmosphere for two or three hours until a temperature of 70° F. is reached, when it is quickly canned and sealed.

* Read before annual meeting of Pennsylvania Pharmaceutical Association, held June, 1920.