the experiment was carried out with phenol, iodine or alcohol.) An explanation of this behavior cannot be given at present. Further work may show its significance.

These investigations are still incomplete and considerable work remains to be done. They promise, however, that the efficiency of germicides may be determined by means of several equations. The equations obtained for each individual disinfectant are expected to show certain similarities which in turn characterize this particular agent independently of standards chosen at random. We have thus far collected data for phenol, tincture of iodine and some for alcohol. Future work should supplement these results and new data on other disinfectants should be collected. We also hope that sufficiently numerous investigations carried out along these lines will give results which may contribute to advance our knowledge of the theory of the action of germicides.

CONTRIBUTION FROM RUTGERS UNIVERSITY,
RESEARCH LABORATORIES OF THE N. J.
COLLEGE OF PHARMACY.

SILVER-ION CONCENTRATION STUDIES OF COLLOIDAL SILVER GERMICIDES. II—CHANGES IN THE SILVER-ION CONCENTRATION OF SOLUTIONS ON STANDING.

BY RALPH B. SMITH.

A method was developed in the first paper of this series[1] for determining the silver-ion concentration of colloidal silver preparations. It seemed desirable to extend the measurements of silver-ion concentrations to solutions of colloidal silver germicides which had stood varying lengths of time; a series was made up and a set of measurements made over a period of 16 months. In order to detect small variations in silver-ion concentration it is necessary to have a method which will give very stable readings. The ordinary methods of plating and short circuiting pure silver wire electrodes, which will give reliable values in concentrations of $N \times 10^{-3}$ or stronger, will not give sufficiently stable readings when the concentration drops to 10^{-6} mols per liter. After much experimentation a method was developed which gives stable and reproducible readings at any silver-ion concentration. The electrode used is an 8-inch piece of No. 14 B & S gage, pure silver wire which is used without cementing into a glass tube, as has been common practice in the past. The electrode is placed in boiling 1% KCN solution for 10–15 minutes and then carefully removed and rinsed without touching any portion of the electrode which will later come in contact with the solution to be tested. The electrode is then stored for at least 15 hours in a solution similar to the one to be tested. It is probable that irregularities on the surface of the electrode are the cause of the unstable readings when the ordinary method of preparation is used but the KCN treatment seems to remove all such difficulties.

The solutions for these tests were made up in 1 per cent concentration for the products of the strong type and in 10% concentration for the other products.

[1] JOUR. A. PH. A., 14 (1925), 10.

These concentrations were selected as those most used in the medical application of these products.

The results of this work have been calculated to p_{Ag} values and also in mols of ionized Ag per liter. They are given in the following table.

			0 day.	1 day.	2 days.	1 week.	1 month.	4 months.	16 months.
Strong	A	p_{Ag}	2.08	2.05	2.05	2.20	2.74	2.93	3.39
		M Conc.	8.3×10^{-3}	8.9×10^{-3}	8.9×10^{-3}	6.3×10^{-3}	1.8×10^{-3}	1.2×10^{-3}	4.1×10^{-4}
	B	p_{Ag}	2.13	2.15	2.12	2.13	2.76	3.10	3.88
		M Conc.	7.4×10^{-3}	7.1×10^{-3}	7.6×10^{-3}	7.4×10^{-3}	1.7×10^{-3}	8.0×10^{-4}	1.3×10^{-4}
	C	p_{Ag}	3.51	3.45	3.45	3.51	4.32	4.88	5.62
		M Conc.	3.1×10^{-4}	3.5×10^{-4}	3.5×10^{-4}	3.1×10^{-4}	4.8×10^{-5}	1.3×10^{-5}	2.4×10^{-6}
Mild	A	p_{Ag}	6.68	6.92	6.78	6.89	7.20	7.17	6.92
		M Conc.	2.1×10^{-7}	1.2×10^{-7}	1.7×10^{-7}	1.3×10^{-7}	6.3×10^{-8}	6.7×10^{-8}	1.2×10^{-7}
	B	p_{Ag}	7.88	8.46	6.98	7.00	7.63	7.27	5.57
		M Conc.	1.3×10^{-8}	3.5×10^{-9}	1.1×10^{-7}	1.0×10^{-7}	2.3×10^{-8}	5.4×10^{-8}	2.7×10^{-6}
	C	p_{Ag}	7.25	7.79	8.12	7.79	8.32	7.88	5.85
		M Conc.	5.6×10^{-8}	1.6×10^{-8}	7.6×10^{-9}	1.61×0^{-8}	4.8×10^{-9}	1.3×10^{-8}	1.4×10^{-6}
	D	p_{Ag}	12.90	12.84	12.70	12.72	13.75	13.94	13.79
		M Conc.	1.3×10^{-13}	1.4×10^{-13}	2.0×10^{-13}	1.9×10^{-13}	1.8×10^{-14}	1.2×10^{-14}	1.7×10^{-14}
	E	p_{Ag}	12.98	12.80	13.02	12.85	13.77	13.89	14.02
		M Conc.	1.1×10^{-13}	1.6×10^{-13}	9.6×10^{-14}	1.4×10^{-13}	1.7×10^{-14}	1.3×10^{-14}	9.6×10^{-15}

The solutions of compounds of the strong type show an almost uniform loss in silver ions in aging. The solutions of materials of the mild type do not in general show any consistent trend. Samples B and C of the mild type show first a decrease and in the last readings an increase in silver ions over the original value. Sample A of the mild type shows the least variations of any of this class and in general shows a more or less regular tendency toward a decrease in silver-ion concentration.

The two compounds of the mild type in which the silver-ion concentration is low show in the first few days a slight increase in silver-ion concentration which is followed by a decrease in the ion concentration over the rest of the time of storage.

Conclusions.—The changes in silver-ion concentration which take place in solutions of colloidal silver compounds within the first month are negligible and those occurring in the first four months are not believed to be great enough to cause any change in the germicidal power.

If any of these solutions on aging, produces irritation, it must be due to changes in the solution other than silver-ion concentration.

RESEARCH LABORATORIES,
E. R. SQUIBB & SONS, BROOKLYN, N. Y.

COLLOIDAL BARIUM SULPHATE.*

BY W. A. LOTT.

Colloidal preparations are becoming increasingly interesting from the point of view of their usefulness in the practice of medicine, and the study of their therapeutic properties and of their preparation is becoming a much attended field of pharmaceutical research.

* Scientific Section, A. PH. A., St. Louis meeting, 1928.