THE USE OF CALCIUM HYPOCHLORITE IN GYMNASIUM SANITATION

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Prior to 1929, bleaching powder (chloride of lime) was the most commonly used chlorine carrier for use in disinfection. Its value was expressed in terms of available chlorine which might range from near zero to 35 per cent. This compound, sometimes incorrectly called calcium hypochlorite, was really the hypochlorite only in part, for some of its chlorine was chloride chlorine and not available for disinfection purposes. The preparation, as might be expected, was highly hygroscopic and when opened to the air quickly became pasty and difficult to use. Moreover its available chlorine was rapidly lost, thus rendering the preparation valueless. Because of these characteristics of bleaching powder, small scale disinfection by use of chlorine and chlorine carrier was seriously hindered. Meanwhile, the sanitary engineer was extending the use of liquid chlorine for sterilization of public water supplies and treatment of sewage. Because of its nature liquid chlorine was not practicable for the small user.

The time was ripe for an improved chlorine carrier when the Mathieson Alkali Works[1] in 1929 announced a new compound of much higher available chlorine content. This compound, which more nearly approached the composition of true calcium hypochlorite, was a white non-hygroscopic solid of greater stability than the earlier bleaching powder and carrying more than double the available chlorine of bleach. Among the other names, this product is known as *High Test Hypochlorite, H.T.H.* The Pennsylvania Salt Manufacturing Co. has placed on the market a similar product, *Perchloron.*

These materials, and others[2], have opened to the sanitarian a convenient agency for the use of chlorine as a disinfectant.

One of the most distressing problems in gymnasium sanitation has been the control of so-called "athlete's foot", a ringworm caused by a fungus growth. Sodium thiosulfate has been widely used in the control of this disease and is still so used. It occurred to the senior author of this paper that calcium hypochlorite might prove effective as a disinfectant for athlete's foot and he suggested to a student, troubled in this way, that a little of the powder be shaken into the shoes, the *High Test Hypochlorite* being at the time a reagent on the laboratory side shelf, used for the production of oxygen. A few days later the student reported that his trouble had disappeared.

At about that time, or a little later, our men's gymnasium had a serious outbreak of the disease and lightly dusting the floors of shower baths and dressing rooms as well as benches with *High Test Hypochlorite* was practiced for a time. It was the expectation that the rather high concentration of the hypochlorite on the soles of feet resulting from walking barefoot over damp floors would prove effective. These hopes were not fully realized, however, because the care-takers failed to spread the material regularly.

Subsequently compulsory foot baths containing solutions of sodium hypochlorite, produced by treating the calcium salt with sodium carbonate, were installed. The foot baths are of rubber and are placed in the doorway between the shower room and the dressing room so that it is, at least, inconvenient for the student to avoid stepping into the liquid. The solution used contained 1 per cent available chlorine (10,000 ppm.), which is twice that recommended by the Mathieson Alkali Works for use in such cases. The chemical tests began when the foot baths were installed, April 18, and were continued to September 29, 1939. The liquid was changed frequently so that in no case did the residual available chlorine after use drop to lower than 0.13% (i.e. 1300 ppm.) and in the majority of cases the percentage decrease was less than 50 per cent, indicating that the

liquid when discarded still had better than 5,000 ppm. of available chlorine. A total of 2,076 students used the baths. Dr. Rachel M. Cooper, the college physician, reports that good progress has been made in controlling the disease.

Below are given the data resulting from the test of each lot of liquid used. The available chlorine was determined iodometrically by titration with standard sodium thiosulfate.

RESULTS OF CHEMICAL TESTS ON THE SODIUM HYPOCHLORITE FOOT BATHS

Original Solution Available Cl		Number of Users	Residual Solution Available Cl		Decrease in Available Cl
%	ppm		%	ppm	%
1.22	12200	33	0.74	7400	39
1.00	10000	33	0.72	7200	28
0.92	10000	40	0.20	2000	78
0.88	8800	40	0.63	6300	31
1.10	11000	45	0.79	7900	28
1.42	14200	52	0.77	7700	45
1.00	10000	61	0.41	4100	59
1.00	10000	61	0.31	3100	69
1.03	10300	75	0.70	7000	32
1.00	10000	81	0.36	3600	64
1.00	10000	91	0.58	5800	42
1.00	10000	91	0.56	5600	44
1.26	12600	93	0.51	5100	60
1.00	10000	100	0.48	4800	52
1.00	10000	97	0.51	5100	49
1.06	10600	101	0.40	4000	62
1.03	10300	102	0.52	5200	50
1.00	10000	105	0.36	3600	64
1.19	11900	109	0.91	9100	23
1.20	12000	112	0.76	7600	36
1.30	13000	116	0.13	1300	90
1.26	12600	131	0.74	7400	41
1.11	11100	145	0.64	6400	42
1.00	10000	162	0.48	4800	52
Total		2,076			

[1] Gage, R. E. Chem. and Met. 36:295 (1929).
[2] Hedgepeth, L. L. Trans. Electrochem. Soc. 67: (1935).