

STABILITY AND MAXIMAL UTILIZATION OF ACTIVE CHLORINE FROM A 10% BASIC SOLUTION OF CHLORIDE OF LIME

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Chloride of lime is a widely used disinfectant. It is an unstable compound (1, 3, 5) and loses 1—3% active chlorine monthly. Because of its instability a 10% basic solution is used which is allowed to precipitate. Twenty four hours later the clear supernatant fluid is decanted and applied in working solutions of different concentrations. The sediment is discarded (1, 2, 5). The basic purified solution is prepared for several days, whereas the working solution — immediately before disinfection. (3)

Recently Genov (2) established a marked stability of 1% solution of chloride of lime and that the sediment contains 5—7% active chlorine.

On the basis of these contradictory views we set ourselves the task to investigate the stability of 10% basic solution of chloride of lime and the method for its processing with regard to the maximal use of active chlorine. The dynamics of the amount of active chlorine in the solution served as criterion.

In a glass flask we prepared 1 l of 10% basic solution which was allowed to precipitate. After 24 hours the supernatant fluid which contained 17,3% active chlorine was decanted. The sediment was filtrated in a vacuum pump. The filtrate contained 5,8% active chlorine, whereas the dry residue — 0,1%. Therefore active chlorine is found in the water soaking the ballast substances which are contained in the sediment. We admitted a possibility to accelerate the transmission of active chlorine from the filtrate to the clear fluid by means of stirring up the solution. For this purpose on May 8, 1963 we prepared 10% basic solutions of chloride of lime in 8 flasks of 1 l each as follows: No. 1 and 1a — as controls (after the so far known method), No. 2 and 2a with stirring up after 3 hours; No. 3 and 3a — with stirring up after 6 hours and No. 4 and 4a — with stirring up after 3 and 6 hours, No. 1, 2, 3 and 4 being open and 1a, 2a, 3a, 4a — sealed. Because on May 9th, in vessels No. 4 and 4a a maximal amount of active chlorine was delivered and in order to investigate the stability of a purified 10% solution without any sediment, on May 12th we prepared two more 10% basic solutions, No. 5 and 5a, in an open and a sealed flask of 1 l each — stirring them up after 3 and 6 hours, the clear supernatant portion being decanted on May 13th.

We tested daily the content of active chlorine in the solution in the course of a month and the, till September 1963 once in a week and once in a fortnight.

Discussion of results

1. In the clear portion of solution No. 1 17,12 g/l of active chlorine are present after 24 hours, whereas in solution No. 1a — 19,51 g/l. The amount of active chlorine gradually increases and on May 25th, i. e.

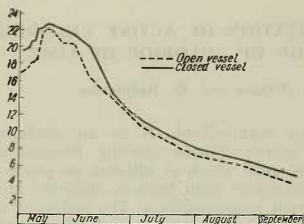


Fig. 1. Dynamics of active chlorine and stability of a 10% basic solution prepared after the method used so far

15 days later reaches its maximum — 22,05 g/l resp. 22,62 g/l of active chlorine. After that a decrease started (Fig. 1). It is obvious from investigations by means of this method, recommended in the literature for the preparation of 10% basic solution 24 hours later in the clear portion 17,12 g/l resp. 17,55 g/l of active chlorine is isolated, whereas the remaining amount to 25 g/l i.e. 6.5 — 7 g/l is discarded with the sediment. In order to obtain a clear solution with a maximal contents of active chlorine it should be subjected to decantation

on the 15th day from the preparation of the basic solution.

2. In the clear portion of solution No. 2 21,28 g/l of active chlorine are present after 24 hours, whereas in solution No. 2a — 21,41 g/l, the maximal amount of active chlorine being reached on the 9th day — 22,30 g/l resp. 23,43 g/l (Fig. 3 and 4).

3. In the clear portion of solutions No. 3 and 3a after 24 hours a larger quantity of active chlorine is isolated — 22,30 g/l resp. 22,36 g/l (Fig. 3 and 4).

4. In the clear portion of solution No. 4 after 24 hours 22,62 g/l active chlorine is isolated, whereas in solution No. 4a — 23,42 g/l which comprises almost the maximal values of isolated active chlorine (Fig. 4).

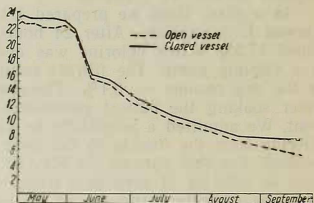


Fig. 2. Dynamics of active chlorine and stability of a 10% basic solution prepared after stirring up on the 3rd and the 6th hour

Therefore the most efficient method for the preparation of a 10% basic solution of chloride of lime aimed at separating a maximum amount of active chlorine and for the shortest time consists of stirring up the solution for 3 and 6 hours and decantation of the supernatant portion of the solution after 18—24 hours (Fig. 5). In this way about 6 g/l more of active chlorine will be utilized as compared with the method used so far. This will substantially increase the efficiency of disinfection.

5. A follow up study of the dynamics of active chlorine in solutions prepared after both methods (Fig. 1 and 2) reveals that in solutions No. 1 and 1a the curve of active chlorine incessantly rises from the 1st to the 15th day. After that a lowering of the curve begins and continues up to the 28—30th day. Later this decrease becomes even more marked. The curve of active chlorine in solutions No. 4 and 4a begins on the 1st day with a highest level, which is retained almost 28—30 days and drops later. These solutions exhibit a month's stability. For that reason they can be used within this period without any loss of their active chlorine content.

6. Following up the dynamics of active chlorine in solutions No. 5 and 5a it is obvious that the curve of active chlorine is retained at a high level for about 25—30 days.

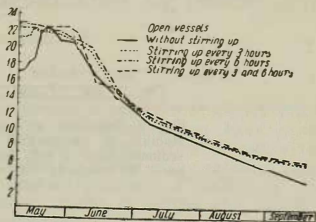


Fig. 3. Dynamics of active chlorine and stability of a 10% basic solution in containers No. No. 1, 2, 3 and 4

Conclusions

1. Agitating the solution after 3 and 6 hours proves to be the most efficient method for the preparation of a 10% basic solution with regard

to the separation of maximum active chlorine within the shortest period of time.

2. The curve of the isolated active chlorine in a clear solution by means of the above-mentioned method starts with a high level after 18—24 hours after the preparation of the basic solution and is retained for 25—30 days. This is indicative of a considerable stability of these solutions. Almost the same data are obtained in clear solutions without any sediments.

3. The preparation of a 10% basic solution in a sealed vessel leads to an increase in the percentile content of active chlorine in a purified solution.

4. The preparation of 10% basic solution of chloride of lime after the above-mentioned method would lead to the increase of efficiency of the desinfection performed.

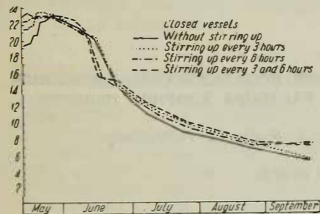


Fig. 4. Dynamics of active chlorine and stability of a 10% basic solution in containers No. No. 1a, 2a, 3a, 4a

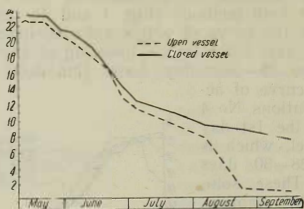


Fig. 5. Dynamics of active chlorine and stability of the purified solution without sediment from a 10% basic solution, prepared by means of stirring up after 3 and 6 hours

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О СТОЙКОСТИ И МАКСИМАЛЬНОМ ИСПОЛЬЗОВАНИИ АКТИВНОГО ХЛОРА ИЗ 10% ОСНОВНОГО РАСТВОРА ХЛОРНОЙ ИЗВЕСТИ

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РЕЗЮМЕ

При приготовлении 10 процентного основного раствора из хлорной извести по применяемому до настоящего времени методу с декантированием через сутки прояснившегося раствора, переходит — 6—7 процентов меньше активного хлора, так как он задерживается в осадке, который выбрасывают. Путем размешивания через 3 и 6 часов в прояснившейся части выделяется через 18—24 часа максимально возможное количество активного хлора, а именно 22,62 г/л, соотв. 23,43 г/л.

Кривая активного хлора начинается с высокого уровня еще в первый день и задерживается в течение 30 дней, что указывает на значительную стойкость этих растворов, и на возможность использовать их в вышеуказанном сроке, без потери в содержании активного хлора в них.