

CHLORINE FOR COLDS

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A considerable amount of interest is being shown at the present time in the use of chlorine for colds and allied diseases. In many instances this interest is beginning to crystallize definitely in the appearance of "chlorine clinics", "chlorine chambers", "Coolidge treatments", etc. In every case the method depends upon the fact that small amounts of free chlorine in the atmosphere are beneficial for colds and general infectious diseases of the respiratory passages. It has perhaps been noticed by many chemistry teachers and students as well that exposure to excessive amounts of chlorine, causing rather severe irritation in the throat and nasal passages and even severe pains in the chest, is almost always followed by complete recovery by the following morning. It is now a fairly well established fact that such doses of chlorine act as a very efficient prophylactic, and subsequent infection is very much minimized.

A general cure for colds has been the mecca of the medical profession for many years. The real discovery, however, of a so-called general cure for colds is again due to the chemist. During the late war it was noticed that the soldiers on duty in the chlorine departments of the arsenals were much less susceptible to colds than the workers in departments where no chlorine was present. During the severe influenza epidemic of 1918-19 the above soldiers were almost entirely immune. As a result of this observation Charles Baskerville (*J. Ind. Eng. Chem.* 12, 293-4) published a digest of correspondence with some twenty-five producers of chlorine. From this data it was found that some thirteen of the largest producers of chlorine reported that among the employees in their chlorine departments there was either an entire lack of infection or most of the cases were very slight. From the several reports of the committee on occupational diseases in the chemical industry (*J. Ind. Eng. Chem.* 12, 439-40), [*Science* 50, 50 (1919)], there is an overwhelming evidence that air containing small amounts of chlorine, bromine or iodine does have a very decided prophylactic effect.

lactic effect. Even such gases as sulfur dioxide were favorably reported on. It is also reported by one of the largest producers of bromine in this country that employees who have worked in the bromine departments for twenty-five years are at the present time in the very best of health and rarely ever are out for colds.

In the winters of 1920 and 1923 the University of Arkansas (Harrison Hale. *J. Ind. Eng. Chem.* 12, 806 and 15, 746) placed a chlorine chamber in operation for a few weeks at a time during influenza epidemics. The concentration of chlorine in the room was not constant. By analysis the amount of chlorine varied from .014-.088 milligrams per liter of air. Due to this high concentration, treatments lasted only 5 minutes each day. Some 800 treatments were given to 184 individuals. Only one of these individuals developed influenza during the epidemic which was severe enough to cause the authorities to close the public schools. In the winter of 1923 during a similar epidemic the treatments were again given in much the same way with results almost as favorable.

We are no doubt indebted to Colonel E. B. Vedder, Director of the Medical Research Division of the Chemical Warfare Service at Edgewood Arsenal, together with the help of Captain Sawyer (*J. Am. Med. Ass.* 82, 764, 1924), for the greatest advances along this line. Most exhaustive researches have been carried out in connection with their chlorine chamber. The concentration of chlorine and length of exposure required to kill most of the common bacteria, when exposed on agar plates, were carefully worked out. The limits of chlorine concentration were then also carefully worked out on both animals and human subjects. It was found for instance that .010 milligrams of chlorine per liter of air can be plainly perceived. Concentrations above .017 milligrams per liter will cause irritation of the throat in 10-15 minutes. .015 milligrams per liter of air can be tolerated by most individuals for at least one hour. As a result, this latter maximum practical limit has been selected by Colonel Vedder as most effective for the average individual. Concentrations below .014 have been found to be very much less effective. It is, of course, needless to say that

the chlorine chamber at Edgewood Arsenal is equipped with the best ventilating system whereby a constant volume of air is continually admitted to the room. The chlorine gas is admitted into this ventilating system. Samples of air are constantly withdrawn for analysis, and the amount of chlorine admitted, regulated according to analysis.

We are especially indebted to Colonel Vedder for the valuable data that he has obtained at Edgewood Arsenal. The treatments were not only carefully supervised but the actual cures effected were carefully recorded. The following tabulation made by Colonel Vedder follows:

| Diseases | No. of Cases | Cured | | Improved | | No Change | |
|---------------------|--------------|-------|----------|----------|----------|-----------|----------|
| | | No. | Per cent | No. | Per cent | No. | Per cent |
| Acute bronchitis.. | 241 | 192 | 80. | 47 | 19.5 | 2 | .5 |
| Acute laryngitis.. | 127 | 99 | 78. | 24 | 19. | 4 | 3.1 |
| and pharyngitis | | | | | | | |
| Coryza (colds) .. | 388 | 288 | 74.2 | 91 | 23.5 | 9 | 2.3 |
| Chronic bronchitis | 47 | 34 | 72.3 | 12 | 25.5 | 1 | 2.1 |
| Chronic laryngitis | 2 | 2 | 100 | | | | |
| Chronic rhinitis... | 106 | 33 | 31.1 | 41 | 38.6 | 32 | 30.2 |
| Whooping cough... | 9 | 8 | 88.8 | 1 | 11.1 | | |
| Influenza | 11 | 9 | 81.8 | 2 | 18.1 | | |
| Total | 931 | 665 | 71.4 | 218 | 23.4 | 48 | 5.1 |

The chlorine chamber of the Army Research Division in Washington, D. C., under the direction of Colonel Harry L. Gilchrist, M. D., Army Medical Corps, with almost as many cases treated shows an average of 45 per cent cured. Chart No. 2 shows this summary (Wis. Med. Jr. 5, Oct., 1924).

CHART NO. 2.

| Diseases | Males | Females | Total | Acute | Chronic | Treatments | Improved | Not Improved | Cured | Result Unknown | Improved | Percentage | | |
|--------------------------|-------|---------|-------|-------|---------|------------|----------|--------------|-------|----------------|----------|------------|-------|--------------|
| | | | | | | | | | | | | Improved | Cured | Not Improved |
| Asthma | 9 | 17 | 26 | .... | 26 | 134 | 8 | 13 | 2 | 3 | 34 | 57 | 9 | 43 |
| Acute bronchitis | 74 | 44 | 118 | 118 | .... | 380 | 45 | 7 | 54 | 12 | 42 | 6 | 52 | 94 |
| Chronic bronchitis | 29 | 21 | 50 | .... | 50 | 250 | 17 | 9 | 21 | 3 | 34 | 19 | 47 | 81 |
| Bronchiectasis | 2 | .... | 2 | .... | 2 | 5 | .... | 2 | .... | .... | .... | 100 | .... | .... |
| Catarrh | 41 | 15 | 56 | .... | 56 | 201 | 31 | 11 | 1 | 13 | 71 | 27 | 2 | 73 |
| Coryza | 373 | 92 | 465 | 465 | .... | 862 | 170 | 19 | 234 | 42 | 40 | 5 | 55 | 95 |
| Chronic colds..... | 36 | 15 | 51 | .... | 51 | 173 | 14 | 7 | 20 | 10 | 34 | 17 | 49 | 83 |
| Hay Fever..... | 7 | 9 | 16 | .... | 16 | 38 | 2 | 13 | .... | 1 | 13 | 87 | .... | 13 |
| Laryngitis | 10 | 9 | 19 | 4 | 15 | 44 | 8 | 1 | 3 | 7 | 66 | 9 | 25 | 91 |
| Pharyngitis | 9 | 2 | 1 | 2 | 9 | 34 | 7 | 1 | 1 | 2 | 78 | 11 | 11 | 89 |
| Psoriasis..... | 2 | .... | 2 | .... | 2 | 5 | .... | .... | 2 | .... | .... | .... | 100 | 100 |
| Chronic rhinitis | 16 | 6 | 22 | .... | 22 | 90 | 8 | 10 | 3 | 1 | 39 | 48 | 13 | 52 |
| Sinus involvement..... | 12 | 5 | 17 | 1 | 16 | 63 | 10 | 5 | .... | 2 | 66 | 34 | .... | 66 |
| Whooping cough | 28 | 17 | 45 | .... | 45 | 231 | 19 | 2 | 19 | 5 | 47 | 6 | 47 | 94 |
| | 648 | 252 | 900 | | | 2510 | 339 | 100 | 360 | 101 | | | | |

Results from the chlorine chamber of the Navy Dispensary at Washington, D. C. are said to be substantially the same as those obtained by the army doctors at Edgewood and Washington.

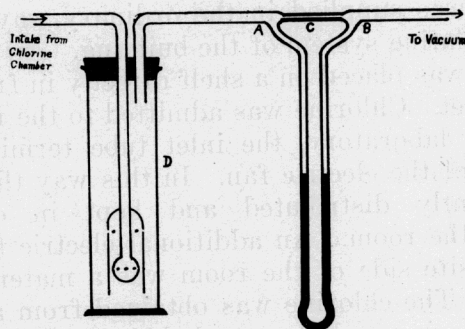
From recent press reports, Dr. Louis I. Harris from New York City claims that the treatment in New York City was unsatisfactory in the case of some 500 patients. Only 6.5 per cent cured were reported. Colonel Vedder points out that careful regulation of the concentration of the chlorine is as necessary for success as is the necessity of administering an ordinary medicine in definite amounts. It is also pointed out by Colonel Vedder and by Colonel Gilchrist that when the "chlorine cure" became better known to the general public, many individuals with chronic ailments of the respiratory passages, in many cases of a score of years standing, presented themselves for treatments and became discouraged after one or two treatments. These so-called hopeless cases were classed among those not cured or improved.

During a recent chemical show held at the Chemical Laboratory at the University of Illinois, on December 6th such a chlorine chamber was placed in operation. The room selected was an ordinary size class room. The ventilation was supplied in the ordinary way from the forced ventilating system of the building. An oscillating electric fan was placed on a shelf directly in front of the fresh air inlet. Chlorine was admitted to the room from an adjacent laboratory, the inlet tube terminating directly back of the electric fan. In this way the chlorine was constantly distributed and kept in circulation throughout the room. An additional electric fan placed at the opposite side of the room was a material aid to circulation. The chlorine was obtained from a cylinder of liquid chlorine and the gas bubbled through a wash bottle to serve as an index for the rate of flow. Air for analysis was continually withdrawn from the room and aspirated through 5 per cent KI solution, by means of a Folin ammonia absorption tube, 50 liters of air being drawn through this solution in 15 minutes. The liberated iodine was titrated with N/100 sodium thiosulfate solution. An analysis was thus made every 15 minutes and

the flow of chlorine regulated accordingly. No particular difficulty was experienced in keeping the chlorine concentration within the prescribed limits, even though visitors passed in and out of the room at frequent intervals. A two hour series of analysis ran as follows:

| | | | |
|------|-------|-------|-----------------------------|
| 1:00 | P. M. | .0146 | milligrams per liter of air |
| 1:15 | P. M. | .0151 | milligrams per liter of air |
| 1:30 | P. M. | .0153 | milligrams per liter of air |
| 1:45 | P. M. | .0148 | milligrams per liter of air |
| 2:00 | P. M. | .0149 | milligrams per liter of air |
| 2:15 | P. M. | .0146 | milligrams per liter of air |
| 2:30 | P. M. | .0154 | milligrams per liter of air |
| 2:45 | P. M. | .0159 | milligrams per liter of air |
| 3:00 | P. M. | .0150 | milligrams per liter of air |

The simplest and most inexpensive flow meter to indicate the rate of flow of air to be analysed is that shown in the accompanying diagram. This was constructed according to the flow meters designed by A. P. Benton (J. Ind. Eng. Chem. 2, 623): The absorption bottle D is shown with the Folin absorption tube in position. Due to the flow of the gases through the capillary C the difference of pressure set up at A and B is indicated by a difference in height of the mercury in the manometer tube. This apparatus was of course previously cali-



brated. Apparatus of slightly more elaborate design for introducing chlorine in definite amounts can be obtained from the National Research Laboratories, Westinghouse Building, Pittsburgh, and also from the Wallace and Tiernan Company, of New York City. The latter is of a portable nature containing a small cylinder of liquid chlorine and a connection whereby the gas is passed

through a glass cylinder containing salt solution. By means of a very simple siphon arrangement the chlorine is discharged into the atmosphere in pulsations, each pulsation containing 30 cc. of a gas.

It is necessary, of course, that several treatments be taken in order to completely cure a cold or to prevent influenza. It is suggested by Colonel Vedder that single treatments should not last for more than one hour, depending somewhat, of course, upon the individuals. Several persons took a treatment of one hour during the chemistry show and reported no particular discomfort at the end of the period although a slight irritation of the throat was noticeable.

Science teachers can be of distinct service to communities by installing such chambers as described above. No special equipment is necessary, but it is quite essential that the chlorine concentration be kept up to the amount suggested in this article. Lesser amounts are very much less effective. The question has also been asked by many individuals if the treatment could not be taken at home. It perhaps can be if proper supervision and precautions are taken. It must be remembered that chlorine in the concentrations used is quite corrosive and metal fixtures would tend to become corroded.

Those of us who are at all familiar with the chemistry of chlorine are aware of the fact that it is difficult to liberate the chlorine completely from hydrochloric acid by the action of ordinary oxidizing agents. Unless heat is applied, MnCl_2 is formed to some extent and the quantities of gas delivered very often fall short from calculated amounts. Home treatment by individuals thus becomes less satisfactory.

The approximate cost of 1 liter of chlorine gas as produced by the various methods may be of interest:

| | | | |
|---|---|---------|-----------|
| 1 | HCl on KMnO_4 | \$.002 | per liter |
| 2 | HCl on MnO_2 | .0019 | per liter |
| 3 | HCl on $\text{K}_2\text{Cr}_2\text{O}_7$ | .003 | per liter |
| 4 | HCl on $\text{Na}_2\text{Cr}_2\text{O}_7$ | .0028 | per liter |
| 5 | HCl on Bleaching Powder..... | .0018 | per liter |
| 6 | Liquid Chlorine | .0011 | per liter |

No doubt special devices for taking individual treatments can and will be devised in such a manner that no

chlorine escapes into the room. On the other hand a chlorine chamber can be fitted up very easily as a reading room and lounge so that maximum comfort may be had by the individual. General experience at Edgewood and Washington has shown that better results are obtained by having the individual completely surrounded by chlorine gas. An interesting story book or two or a few popular magazines will help to popularize the treatment.

In conclusion it must be urged that if this great cure and preventive is to benefit the public at large as we hope it may, it must be kept out of the hands of the professional quacks and other mercenary individuals. Already fake nostrums are appearing on the market reputed to contain chlorine. On a community basis the cost of treatment per individual will be less than 5 cents. Some of the professional chlorine clinics are charging at least one dollar per treatment. The community science teacher can make himself of real service by enlisting the cooperation of the various health departments in this benefit to humanity.