

RECENT PROGRESS IN THE USE OF OZONE IN VENTILATION.

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The name ozone is associated with freshness in the air such as is experienced after thunderstorms; and in the open country at almost all times! Great interest has been taken in the observation of "ozone days" in the past and a large amount of data has been accumulated, mostly of little value. With these associations the name possesses good advertising value and advantage has been taken of this to exploit the use of ozone to an extent comparable almost with gold mining or oil well prospects. The great number of extravagant claims, which have been made, have tended to bring this activated form of oxygen in considerable disrepute with scientists and others who like to be careful as to the truth of the statements they accept. The reaction has been so great that a good many people have come to think that the term "ozone" and all it signifies is merely a snare and delusion. Just because bad oil stock has been sold is not a good reason for believing that all oil stock is worthless; nor is it right to allow oneself to be completely prejudiced by extravagant claims of certain unscrupulous persons. Let us first of all, consider the actual facts of the case.

Ozone *docs* seem to have a stimulating effect if taken at the correct concentration. Thus, right after a thunderstorm, when the air is exhilaratingly fresh, ozone is present at a concentration of about one part in ten million. This is sufficient to act on a sensitive photographic plate. Such a concentration is not at all harmful but is actually stimulating. But this stimulation is not one with harmful after effects, since it consists in the addition to the blood of a more active modification of oxygen which is then used in oxidizing the fuel in the body, thus making available more energy for muscular work.

Other stimulants like alcohol have injurious side actions which often cause a great deal of harm. But even here the claim is made and supported by considerable evidence that alcohol in small concentrations is practically harmless and may even be possibly beneficial. The ill effects of highly concentrated alcohol are too well known to need more than mere mention. In a similar manner ozone of a concentration of more than one part in a million becomes harmful. It begins to attack the mucuous membrane with very disagreeable results. Headaches are produced which are apt to be very disagreeable. It does not take very much ozone to make more than one part in a million of air, so that the mistake that has been made by most exploiters was to use apparatus of too high a capacity. With the production of too much ozone disagreeable results have followed.

For office ventilation there are manufactured by many concerns in this country and abroad cabinet ozonizers which produce a lot of ozone for a very small power consumption. Since a large part of the price of the apparatus depends upon the size, the tendency has been, partly through greed and partly through ignorance to make ozonizers too big. I have known of a great many cases where these cabinets have been installed in banks and offices where after a while they have had to be discarded because of the concentration being much too great. To be successful, the amount of

ozone should be so low that the ordinary person does not notice its presence on entering the room where it is used. Most of the cabinet forms of ozonizers have had perhaps ten times too great a capacity.

There are certain places where it would be very desirable to have better air. The crowded office and school room, the well attended movie theater and church, or the basements of the large department stores, all have trouble in securing proper ventilation. There seem to be exhaled from the human body certain substances which tend to make the air feel "close" and after they have been breathed a little while a person becomes drowsy and feels uncomfortable. To provide fresh air the atmosphere in a crowded room has to be renewed sometimes as many as eight times in an hour. In the cold weather this means that a lot of coal is required to warm up all of this air which does not remain behind very long before it is discarded. If some means could be provided for removing the deleterious substances from this air allowing it to be recirculated there would be a great saving in coal. The question then arises as to whether ozone will accomplish this desirable result. About this question there has been waged quite a little controversy pro and con. Emphatic statements have been made on both sides so that it is somewhat difficult to decide just what the truth of the matter is and a careful survey of the literature does not settle the question either way, for there are not sufficient results of decisive experiments to allow one to decide. Until the question has been cleared up by high class experimental work, which will analyze the problem into its different factors, we shall have to fall back upon certain positive results which have been actually obtained in practice.

In St. Louis, and the same thing must hold true here in Indianapolis, the school rooms where colored children or the children of the "great unwashed" portion of the population gather are rather hard to ventilate. In St. Louis a number of the teachers in such schools were complaining of ill health and great discomfort from the inadequate ventilation. The children too, would become drowsy and the school work did not go forward as it should. When some of the teachers threatened to resign the problem was put up to Mr. Hallett, the chief engineer of the school board. He recommended the use of ozone and had it installed in two of the worst schools. After that complaints ceased and a questionnaire sent out to the teachers found them enthusiastic about the new system. Not only were they relieved from the almost nauseating bad odors but the children were also taking an interest in their work which they had not shown previously. The experiment has been so successful that the use of ozone has been extended to many other school buildings in that city and when a new building is put up an ozone system is always included.

Economically, the big advantage of the system is that the air can be recirculated so that a large part of the heat is saved. The writer visited a school in the city of St. Louis where air was recirculated with the aid of ozone. The odor of ozone was barely perceptible so that it was not at all disagreeable. The children were not at all drowsy as they so often are in the middle of the afternoon, but were very wide awake. The teachers on being questioned, all were quite enthusiastic about the ventilation, and one dear old frail lady said that she had not lost a day since the introduction of ozone, whereas before she had lost a great deal of time.

Successful installations have also been made in the offices of The Brown Shoe Co. and in the system for ventilating the great basement of the Grand Leader department store. Usually in the basement of a large department store the ventilation is very bad, but none of that is to be noticed in this place. The air that enters from the outside is partially ozonized, passes over one set of heating coils, through a humidifier, and then over another set of heating coils and out into the room. The odor of ozone can barely be detected by a sensitive nose. The people employed there are unaware that ozone is being used but they also have no complaint to make about the ventilation.

That there is a great field for improvement in the ventilation of most of our crowded buildings almost no one will deny. But that ozone would give relief is strongly doubtedly by a great many people. The reason for the doubt has been that, while a little ozone is a good thing, a great deal of ozone is too much of a good thing. In most installations the trouble has been that not *little* enough ozone has been used. Like perfumery the best effect is secured by the use of almost vanishingly small quantities. If the ozone treated air is allowed to come in contact with water, as in a humidifier, most of the ozone is decomposed. During the decomposition the opportunity to oxidize any organic matter present would be very great so that a very high percentage of bacteria and bad odors would be removed and destroyed.

Ozone, moreover, has a tendency to cling to the clothes and to the skin which are the source of many of the bad odors. The writer has noticed the smell of ozone clinging to his fingers and clothes for a couple of hours after working with the substance. Such an accumulation of ozone near the origin of the deleterious substances would be especially effective in preventing them from getting out into the air. Before these ideas are accepted generally, however, very carefully controlled experimental work must be done. It is believed by many who have gone into the matter carefully and without prejudice that ozone can be successfully used to solve a large number of the problems of ventilation provided constant care is taken to allow for its peculiar properties and the resulting limitations placed on its use.

