In garages and testing rooms the air is frequently contaminated with gasoline vapors and unsaturated gases, resulting from incomplete combustion, which cause headaches and feelings of lassitude. Ozone is valuable in oxidizing these gases and freeing the air from odor. However, CO must always be taken into consideration. It is an odorless and very insidious poison, since the victim has no warning of his condition until coma is induced. Four parts of CO per ten thousand of air is the maximum concentration which may be respired continuously without noticeable effect. (Henderson, Yandell, et al—*Journal. Ind. Hyg.* Vol. 3, 1921). Carbon monoxide frequently has been found present in quantities much greater than four parts per ten thousand in the atmosphere of garages and the like, and so far, adequate ventilation is the only remedy known. It is obvious that, chemically, ozone has nothing to offer for carbon monoxide correction, since the reaction is, at best, slow in the absence of a catalyst, and a molecular concentration of ozone comparable with a lethal concentration of CO, would produce quite as much physical distress as the carbon monoxide. Carbon monoxide is the index of good garage ventilation; this factor may be favorable and still an odoriferous condition, causing minor distress, may attain. Here ozone is of value, but it must be used with judgment, and does not permit of a curtailment of any of the ordinary CO precautions. Ozone and ionized air may possibly have some physiological effect on the haemoglobin, which may cause a shift, in selectivity, in favor of oxygen, but to date knowledge on this subject is not available.

The Production of Ozone

The air actually passed through an ozone generator should be free from water vapor, dust and gases normally foreign to the atmosphere. Rideal (Ozone, D. Van Nostrand) states that a RH of 25 per cent, at a dry bulb temperature of 20 deg. Cent., limits the yield of ozone 60 to 70 per cent of that which would be produced with dry air, other conditions being equal. The vapor content of air to be ozonized should not exceed 0.1 grains per cubic foot, for the best results.

The presence of sulphur dioxide, nitrogen dioxide, chlorine, etc., appreciably reduces the efficiency of an ozonizer. Ammonia gas, should it be admitted to the ozone generator in appreciable quantities, may cause an explosion.

The presence of dust favors the passage of sparks, which cause thermal decomposition of the ozone, and adds to the formation of oxides of nitrogen. Ozone generators are now generally supplied with an air filter.

Sparking and "creeping discharges," which frequently form at the edges of the electrodes, should be prevented by the proper design of the electrode members.

The rate of decomposition of ozone is greatly accelerated at high temperatures, therefore, ozonizers should be operated with a minimum temperature rise. At room temperatures the rate of decomposition is negligible.

Due to the catalytic effects on the decomposition of ozone, inherent in commercial ozonizers, there is a decided limiting concentration at which ozone may be produced. As a rough approximation, it may be stated

that the rate of decomposition is proportional to the concentration of ozone. Thus, the energy necessary to produce high concentrations is much greater than that required to produce the same weight of ozone in a more dilute state. The rate of air flow, to energy input, determines the concentration; therefore, air flow is a very important factor in ozonizer design. However, it must be pointed out that the yield does not increase indefinitely, with increasing air flow; and since the power required to dry the air is considerable, in relation to the power required to produce the quantities of ozone used in ventilation, it becomes necessary to strike a compromise between these two costs, in order to obtain the lowest gross cost of production.

Hill and Aeberly (*Heating and Ventilating Magazine*, December, 1921) have published graphs showing the relation between yield of ozone and air flow, while Hartman (*Ice & Refrigeration*, November and December, 1924) has given a detailed analysis of this factor, in the terms of dollars and cents.

Analysis of Ozone-Air Mixtures

Ozone, in air, is best determined quantitatively by iodimetric titration. Of the numerous methods, for the quantitative determination of ozone, that have been advanced from time to time, none combine as high an order of accuracy with simplicity of technique, as does this standard method, the technique of which is familiar to all chemists or may be found in any textbook of volumetric analysis. A few precautions, not ordinarily described in standard textbooks, should be observed when applying this method to ozone determinations (See Hartman, F. E., Analysis of Ozone-Air Mixtures, *Aerologist*, August, 1926.)

As the output of an ozonizer can be very closely controlled by the manufacturer, it is recommended that the output be checked, when desired, by an analysis of the ozonized air coming directly from the ozonizer, thus eliminating the errors inherent in fan deliveries, leakage, etc., which may be addative, and of sufficient magnitude to give quite an erroneous idea of the performance of the ozonizer.

It is frequently desirable to determine the concentration of ozone actually produced in the spaces for which the ventilation is intended. Such concentrations are generally of the order of 0.01 ppm minimum, to about 0.5 ppm maximum, and are without the range of accuracy of the standard iodimetric method. A fairly accurate, and comparatively simple, method for determination of concentrations of this order has been devised by Yant, Jones & Houghten, which is described in detail in the Transactions, A. S. H. & V. E., Vol. 29, p. 331 et seq., 1923.

Periodical checks of the actual output of the ozonizer, together with a check of the concentration established in the ventilated spaces should be fruitful of exceedingly interesting and suggestive data.

Determining Proper Concentration

The concentration of ozone in the air of ventilated spaces, should not be allowed to rise appreciably above 0.01 ppm. However, this does not mean that this is the proper concentration to introduce. The quantity of ozone necessary to maintain this concentration will depend upon what has been aptly termed "respiratory load," or cubic feet of air, per person,