either be the known performance of actual commercial drying installations handling the same stock or direct experimental determinations in the laboratory. Data of this type for many materials are given in Table 1.

Where it is necessary to determine drying conditions and rate in the laboratory, it is vitally important properly to control the experimental conditions. Where possible, the material upon which the experiments are made should have the same shape and size as that to be treated commercially. Furthermore, the conditions of exposure to the drying air, the temperature and humidity of that air, and its velocity and distribution over the material should be identical with those used in the full-scale operation. Where the commercial operation is by batch, it is relatively easy to duplicate commercial conditions in the laboratory. However, where continuous operation is intended, it is usually difficult to build a continuous experimental dryer. In such a case, a preliminary diagram of the type of Fig. 5 should be constructed and the drying conditions of the batch experimental operation controlled in the laboratory to conform to the humidity moisture content relationship of the ultimate continuous operation. In this way, dependable data on the drying rate can be obtained in the laboratory.

An understanding of the mechanisms of drying and of the drying characteristics of the material to be dried is of the utmost importance in designing successful and economical dryers, especially in the interpretation and extrapolation of plant and laboratory test data. Air velocity has an important influence on the rate of drying in the constant rate period and in the first zone of the falling rate period, but in the second zone of the falling rate period the rate of diffusion of water to the surface controls the drying, and hence increasing the air velocity past the surface can have little effect on the rate of drying.

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CHAPTER 30

OZONE AND VENTILATION

Physical, Chemical and Germicidal Properties; Deodorizing Ozone Production; Proper Concentration; Industrial Uses.

OZONE is a normal constituent of pure, natural air and its quantity varies with the topography of the country, particularly with regard to the altitude, the presence of bodies of water, and certain plant life. It is used in ventilating systems to destroy odors.

Ozone is produced, photo-chemically, by ultra-violet light of short-wave length (1,200–1,800Å), while light of greater amplitude (3,000–3,300Å) exerts a decomposing effect. At high altitudes, where short-wave radiations are more intense, ozone naturally occurs in greater quantities. It is continuously under the destructive effect of longer waves, however, but a dynamic equilibrium is finally reached between the rate of formation and the rate of decay, which shifts with the altitude. Since light of longer wave length penetrates closer to the earth than does that of shorter amplitude, the equilibrium becomes favorable to ozone directly as the altitude.

In summing up the evidence at hand it may be concluded that ozone, while mostly absent from city air, is normally present in pure country air, but in amounts that are difficult to estimate accurately. In nature the air is continuously under ionizing influences, and the enclosing of air, as in buildings, excludes these influences, in addition to destroying the original ionization of the air. Ionization is involved in chemical activity.

The process of ozonizing, in addition to supplying ozone, ordinarily absent from city air, further provides considerable ionized oxygen, producing a fresh, chemically active air, comparable with fresh, pure air of nature.

PHYSICAL CHARACTERISTICS[1]

Density: Calculated Value; 1.66.

The foregoing value refers to air as unity. Its rate of diffusion, with respect to oxygen is 0.75.

At a temperature of 270 deg. cent. (518 deg. fahr.), ozone is instantly decomposed.

Odor: Strong, penetrating and characteristic. Perceptible to the sense of smell in concentrations above 0.01 p.p.m., by volume.

Olfacity (minimum perceptible concentration expressed in molecules per c.c.) 2.705×10^9 at 0 deg. cent. and 760 m.m. Hg.

Solubility: Soluble in water and dilute acids, quite soluble in carbon tetrachloride and many vegetable oils.

[1]See THE GUIDE, 1929, for further physical properties.