1 lb. of water, under the most favorable conditions, while the more usual figure for steam consumption is 2½ lb. of steam to 1 lb. of water evaporated. The principal losses in air drying are radiation and escape of unsaturated air, either through the usual vent ducts or by leakage through the kiln walls.

Practically every problem in air processing and drying presents its individual considerations which affect the over-all efficiency of the final installation. The peculiarities of the material to be dried, the allowable temperature and humidities, the most efficient means of handling the material, the speed with which the process must be effected, and the mechanical or physical limitations imposed by the plant conditions themselves are all factors which must be carefully considered in the design of air processing and drying equipment.

It is customary for engineers who specialize in the design of such equipment to treat each problem individually and develop the most efficient for the specific requirements of the client.

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CHAPTER XXIII

OZONE IN VENTILATION

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.

Ozone is produced, photo-chemically, by ultra-violet light of short wave length (120-180 μμ), while light of greater amplitude (300-330 μμ) 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 continuoulsy 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 Properties

Density—Observed Values; 1.657 (Otto, Direct weight method).
1.717 (Soret, by diffusion),
Calculated Value; 1.66

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

Heat of Formation—The production of ozone is an endothermic reaction, the heat of formation being 34,000 calories per gram molecule (Jahn, Zeit. Anorg. Chem. 68, 250; 1910).

Boiling Point, −112 deg. cent. (International Critical Tables, 1926).

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 (Hill & Aeberly, *Heating and Ventilating Magazine*, December, 1921).

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

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

Its solubility in water, like all gases, is dependent upon the temperature and partial pressure. Nernst (Festschrift, 391; 1912) gives the solubility coefficient for water, at

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