temperature conditions. Silica gel and alumina exhibit a strong preference for water vapor whereas charcoal does not.

Combustion Devices

This group of industrial air cleaners entails the use of high temperatures or catalysis combined with some elevation in temperature to destroy or decompose organic and some inorganic gases which create obnoxious odors. The devices are divided into those in which combustion is obtained by use of liquid or gaseous fuels and the secondary air for combustion is provided by the contaminated air. In essence, the simplest form involves passing the contaminated air through the combustion chamber of a boiler or fire box. Special fire boxes or brick checkerwork may also be employed. Catalytic devices consist of noble metal packed into frames in the form of ribbons or screens or may be ceramic granules coated with noble metal catalysts. The frames or packing are placed in a housing over which the gas stream to be decontaminated is passed. The contaminants break down and are reduced to elemental gases of an innocuous nature. Catalysts reduce the amount of heat necessary but may become contaminated by sulfur or other elements.

The performance of a combustion device is dependent upon the retention period of the contaminant in the high temperature zone. Removal or destruction is thus dependent on velocity and surface area of the heat transfer device. If properly designed, obnoxious odors are removed.

The resistance of the direct combustion unit is negligible since it is an integral part of the fuel combustion system. Catalytic devices behave in a manner comparable to packed beds or filters except that they are not plugged by organic particulates but may be affected by inorganic solids.

Maintenance of these types of units is essentially dependent upon the contaminants encountered. The direct combustion system requires little care other than that required by ordinary fuel burning equipment. Catalytic units become contaminated slowly and will require removal for reactivation at certain intervals depending upon the application.

Economic factors may limit the use of direct combustion methods unless there is a demand for the heat generated. They may best be applied to processes employing combustion. Catalytic units require temperatures of at least 500 F and consequently it may be necessary to preheat the contaminated air to this value.

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