

Activated carbon adsorbs iodine very well. The iodine capacity, mg/g, (ASTM D28 Standard Method test) may be used as an indication of total surface area.

Carbon monoxide is not well adsorbed by activated carbon. This should be of particular concern to those using the material in filters for respirators, fume hoods or other gas control systems as the gas is undetectable to the human senses, toxic to metabolism and neurotoxic.

Substantial lists of the common industrial and agricultural gases adsorbed by activated carbon can be found online.<sup>[22]</sup>

Activated carbon can be used as a substrate for the application of various chemicals to improve the adsorptive capacity for some inorganic (and problematic organic) compounds such as hydrogen sulfide (H<sub>2</sub>S), ammonia (NH<sub>3</sub>), formaldehyde (HCOH), mercury (Hg) and radioactive iodine-131(<sup>131</sup>I). This property is known as chemisorption.

## Iodine number

Many carbons preferentially adsorb small molecules. Iodine number is the most fundamental parameter used to characterize activated carbon performance. It is a measure of activity level (higher number indicates higher degree of activation<sup>[23]</sup>) often reported in mg/g (typical range 500–1200 mg/g). It is a measure of the micropore content of the activated carbon (0 to 20 Å, or up to 2 nm) by adsorption of iodine from solution. It is equivalent to surface area of carbon between 900 and 1100 m<sup>2</sup>/g. It is the standard measure for liquid-phase applications.

Iodine number is defined as the milligrams of iodine adsorbed by one gram of carbon when the iodine concentration in the residual filtrate is at a concentration of 0.02 normal (i.e. 0.02N). Basically, iodine number is a measure of the iodine adsorbed in the pores and, as such, is an indication of the pore volume available in the activated carbon of interest. Typically, water-treatment carbons have iodine numbers ranging from 600 to 1100. Frequently, this parameter is used to determine the degree of exhaustion of a carbon in use. However, this practice should be viewed with caution, as chemical interactions with the adsorbate may affect the iodine uptake, giving false results. Thus, the use of iodine number as a measure

of the degree of exhaustion of a carbon bed can only be recommended if it has been shown to be free of chemical interactions with adsorbates and if an experimental correlation between iodine number and the degree of exhaustion has been determined for the particular application.