TIGG™
Subsidiary of Spencer Turbine

Why are Activated Carbons Different?

Activated carbons are different because of the starting material and manufacturing methods. These raw materials establish the general characterizes, and differences will exist in the finished product.

Domestically most carbons are manufactured from coals. The base raw material and pretreatment steps prior to activation can affect many of the physical and activity characteristics of activated carbon. These different properties make some carbons more suited than others for specific applications.

Bituminous coal activated carbons have a broad range of pore diameters. Since these carbons have both a fine and wide pore diameter, they are well-suited for general dechlorination and the removal of a wider variety of organic chemical contaminants from water, including the larger color bodies. Coconut-based carbon tends to exhibit greater microporosity, which is more suited for removal of low concentrations of organics such as in drinking water applications.

This property can be deduced when comparing iodine numbers on the activated carbons. Carbons with higher iodine numbers will tend to have larger surface area; therefore, they will have higher capacity for comparatively weakly adsorbed organics. On the other hand, carbons with lower iodine numbers may still have wider pores, which could be favored for removal of large organic molecules. There are some applications where color removal will be better facilitated by a reactivated carbon as opposed to a high iodine carbon.

Another comparative factor is the hardness of the carbon. For instance, the abrasion resistance of activated carbons can be important if the carbon is to be used in an application where frequent back-washing will be required. As mentioned above, coconut carbons have a higher abrasion number than bituminous coal-based carbons and thus would be expected to experience less attrition over time in this type of an application.

Density can also be a major consideration for specific applications. As the table below shows, the densities of activated carbons vary with the raw material. Fewer pounds of carbon with a low density will fit into a given container as compared to a carbon with a high density. This is significant because, while a container may require less carbon weight of a low-density carbon to make a volume fill, its contaminant removal performance may be severely reduced as compared to a higher density carbon.

Table 1
Typical Properties of Activated Carbons Produced from Different Raw Materials

	Coconut	Bituminous	Lignite
Iodine Number	1,100	950	600
Abrasion Number	85	75	60
Bulk Density as packed in column lbs/ft^3	25	25	23
% Ash	3	6.7	20.1

Ash content can play an important role in applications for water treatment. The water soluble ash fraction may be liberated on contact with the activated carbon; this may lead to undesirable effects, such as imparting cloudiness to the water. Some applications with water having low pH can also liberate acid soluble ash and can actually impart color, such as when coal-based carbons are exposed to low pH water

and iron is eluted from the carbon, imparting a yellowish-orange color to the effluent water. The table above summarizes these comparative properties.

While activated carbon is very useful for applications such as municipal water treatment, it is important for the user to solicit the product information and pricing from the activated carbon provider, ensuring that the best possible choice is made for the application. In this way, although a number of carbons may be good candidates for the application, the one that may offer the best cost-effective solution is the one that is used.