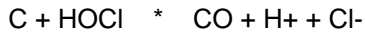


Dechlorination on GAC

For many years, food and beverage manufacturers have relied on activated carbon to remove chlorine, and other taste and odour causing compounds, from water used in their processing.

While the removal of organic taste and odour causing compounds results from the phenomenon of adsorption, dechlorination occurs as a result of the chemical reaction between the activated carbon and the free chlorine (HOCl) or the hypochlorite ion (OCl⁻) present in the water. The reactions can be represented as follows:



Where C represents the activated carbon, and CO the surface oxide formed on the carbon as a result of the reaction. Under certain conditions, the surface oxides may be released as carbon monoxide (CO) or carbon dioxide (CO₂).

The process of dechlorination is dependent on such factors as influent chlorine concentration, temperature, pH, the empty bed contact time (EBCT) utilised, and the presence, or otherwise, of dissolved organic species which may reduce the carbon's effectiveness for dechlorination. Generally, EBCT's of 5 - 10 minutes are utilised for chlorine removal, although EBCT's of as low as 3 minutes have been used successfully.

The reaction of free chlorine with activated carbon is favoured by pH levels of 5 - 6, where the HOCl species predominates, rather than at pH levels of 8 - 10, where the less reactive OCl⁻ species predominates; as a general rule, the rate of dechlorination at pH 5 - 6 is some 4 times greater than at pH 8 - 10. The dechlorination rate, at temperatures between 0 - 90°C, is approximately doubled for every 20°C rise in the water temperature.

Chlorine breakthrough can be anticipated after a loading of approximately 1 gram of chlorine per gram of activated carbon.

As well as dechlorinating, activated carbon has the ability to remove a wide range of organic compounds from water. While the presence of low molecular weight, dissolved organics will have little or no effect on the dechlorination efficiency of a particular activated carbon, the presence of high molecular weight, long chain organic compounds may have a detrimental effect on dechlorination life.

Experience with dechlorination service has shown that regular backwashing, to remove particulate material, will have a positive effect on both filtration efficiency and dechlorination efficiency. A bed expansion, on backwashing, of 30% is suggested as an optimum.

James Cumming & Sons can supply high activity, coal based activated carbons which have proven to be highly effective for dechlorination, while at the same time possessing the hardness to withstand frequent backwashing.