

Application Bulletin

Granular Activated Carbon For Wastewater Toxicity Reduction

Description

Federal and state regulatory agencies are increasingly requiring additional water quality testing procedures - both chemical and biological - to better control the toxicity of discharges to receiving streams.

The EPA is especially concerned that many chemicals not on its priority pollutant list may nevertheless cause toxic effects in fish and other organisms in United States surface waters. Therefore, the EPA has developed protocols to measure the toxic effect a discharge may exert in the receiving stream.

This heightened focus on whole effluent toxicity (wet) has a direct impact on industrial discharges and Publicly Owned Treatment Works (POTWs) operators. In applying for new, modified, or renewed National Pollution Discharge Elimination System (NPDES) permits, dischargers are increasingly required to include wet testing to assure compliance with standards established for aquatic toxicity. They may also be required to add additional treatment steps when effluent toxicity levels are found to be unacceptably high.

Toxicity as an NPDES Permit Criterion

Toxicity is defined as any adverse biological effect. It is categorized as either acute or chronic. Acute toxicity means that the adverse effect reported is the death of an organism. Chronic toxicity means that the adverse effect reported is reduced growth, reduced reproduction, immobility, or inhibition of any other normal growth function of an organism.

The type of toxicity test required of industrial and municipal facilities is generally a function of the discharge volume and the dilution available in the receiving body. Where high dilution levels are available, acute toxicity testing of the whole effluent is usually considered to be an advantage to safeguard the receiving body. For low levels of dilution where there is a greater risk for toxic effects, chronic toxicity tests may be preferred.

While some dischargers may already have to meet acute toxicity criteria as part of their permits, new permit

ting standards may require them to satisfy chronic toxicity criteria and/or test for toxic effects using more sensitive aquatic organisms.

GAC Helps Meet The New Requirements

If organic chemicals have been identified as contributing to discharge toxicity, Calgon Carbon Corporation can work with dischargers, and their engineering firms, to help meet stringent criteria associated with their NPDES permit. Granular activated carbon (GAC) can be employed as a cost-effective treatment approach for removal of organic compounds and toxicity.

Even in situations where activated sludge treatment or activated sludge in combination with powdered activated carbon is used for primary wastewater treatment, post treatment with GAC may be necessary to achieve toxicity compliance.

Whatever the application, Calgon Carbon Corporation can supply a broad range of support services - including R&D assistance, laboratory or field scale pilot testing, operating recommendations, and design and application engineering expertise - that will save time and money for dischargers seeking to meet the treatment objectives mandated in their permits.

Specific Application

A number of industries now use GAC to satisfy their wastewater toxicity discharge criteria. Examples are:

After completing Toxicity Reduction Evaluation (TRE) programs, two oil refineries determined that organic chemicals in their wastewater were contributing to unacceptable toxicity levels. One of the refineries already had a biological treatment process in place, but the effluent was not consistently meeting permit limits. After screening several technologies, it was determined that GAC was the most economical technology that could dependably produce an effluent satisfying their discharge criteria.

Full-scale GAC systems to treat between 5-10 mgd flows were installed on the wastewater discharges at both



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refineries. One refinery installed several Calgon Carbon Corporation Model-10 standard adsorber vessels; the other uses a custom-designed Calgon Carbon Corporation system. These systems have helped both refineries meet acute fish toxicity requirements for several years.

Another application involved a truck-washing operation. Because the flow at the site was small, the customer selected several 55 gallon Flowsorb canisters (each containing 165 pounds of activated carbon). Operating in series configuration, these small but complete adsorption systems are effectively treating wastewater flows of less than 10 gpm and reducing toxicity to crustaceans to acceptable levels.

Also, after successfully completing large pilot scale testing at an organic chemical facility producing 2 mgd of wastewater, Calgon Carbon Corporation will install a full-scale adsorption system designed to remove daphnia and fathead minnow acute toxicity.

Summary of Capabilities

Calgon Carbon Corporation is the world's largest producer and reactivator of granular activated carbon. The company is also the only U.S. GAC producer with a large, customer-oriented R&D department. Based on more than 50 years of research and engineering experience, we have acquired a broad range of applications evaluation, pilot study, full-scale treatment and toxicity reduction expertise.

Today the company offers toxicity reduction services including engineering design, system installation, operator training, start-up assistance, and ongoing technical support. We also can provide off-site carbon reactivation service that includes spent carbon removal, transport, storage and reactivation at two fully permitted RCRA Part B facilities. Carbon reactivation assures the complete destruction of the adsorbed toxic organic chemicals.

Tailored to fit your needs, GAC-related services may be supplied on a predetermined monthly fee basis or purchased separately as needed.

If you would like more information about how Calgon Carbon Corporation can help you meet toxicity reduction challenges, please call (412) 787-6700 or (800) 4-CARBON.

Safety Message

Wet activated carbon preferentially removes oxygen from air. In closed or partially closed containers and vessels, oxygen depletion may reach hazardous levels. If workers are to enter a vessel containing carbon, appropriate sampling and work procedures for potentially low oxygen spaces should be followed, including all applicable federal and state requirements.



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