

## Introduction

There are situations where it becomes necessary to disinfect granular activated carbon (GAC) beds due to the presence of bacteria. The bacteria are usually present because of oxygen depletion in wastewater and potable water applications, and low temperatures (>140°F) in food-related applications (sugars, etc.). The procedure described below is intended for in situ disinfection of carbon in an adsorber containing 20,000 pounds of GAC. By adjusting the amount of sodium hydroxide, larger or smaller carbon beds can be disinfected with this procedure.

**Caution** Due to the hazardous nature of sodium hydroxide (NaOH) and hydrochloric acid (HCl), appropriate protective clothing such as a face shield, goggles, gloves and impervious clothing must be worn when handling these chemicals. For specific instructions, refer to your plant procedures and/or material safety data sheets for these chemicals. Materials of construction must be compatible with NaOH and HCl.

## Disinfection

1. Take the adsorber off line and make sure that a line on top of the adsorber is open to serve as a vent.
2. Drain the water from the adsorber through the adsorber effluent line.
3. Pump 5% sodium hydroxide into the adsorber through the effluent line. For Calgon Carbon's backwashable Model 10 and Model 12 adsorbers, the required volumes are 7,000 and 6,000 gallons, respectively. See step 9a for an alternate procedure.
4. Stop pumping when the NaOH solution overflows through the vent line.
5. Allow the carbon to soak in the sodium hydroxide for at least four hours.
6. Drain NaOH solution from the adsorber through the adsorber effluent line.

## Neutralization

7. Wash the carbon by adding contaminant-free or clean water through the effluent line for 7-10 hours at a flow of 1.3-3 gpm/ft<sup>2</sup> in order to wash out the residual sodium hydroxide and neutralize the carbon. The disinfection is then complete.
- 8a. An alternate, faster procedure for neutralizing the carbon includes acid treatment. After the sodium hydroxide solution is drained from the adsorber, pump 5 gallons of reagent grade hydrochloric acid (37% HCl) into the adsorber through the effluent line.

- 8b. Fill the adsorber with clean water by backfilling through the effluent line at 3-5 gpm/ft<sup>2</sup> so as to thoroughly mix the content of the adsorber. Shut off the backfill water when it begins to overflow through the vent line.
- 8c. Allow the carbon to soak for 60 minutes, then drain the adsorber. Check the pH of the water, which should be in the range of 8 to 10.
- 8d. Wash the carbon by adding clean water through the effluent line at a rate of 1.3-3 gpm/ft<sup>2</sup> until the pH of the effluent water matches the influent water or within desired pH range. Disinfection is then complete.

## Alternate Disinfection Procedure

- 9a. After step 2, add ~ 1,000 gallons of clear water through the effluent line.
- 9b. After completing step 9a, pump the contents of two 55-gallon drums of 50% sodium hydroxide into the adsorber through the effluent line.
- 9c. Fill the adsorber with clean water by backfilling through the effluent line at 3-5 gpm/ft<sup>2</sup> so as to thoroughly mix the contents of the adsorber.
- 9d. Shut off the backfill water when it begins to overflow through the vent line. Check the pH of the water exiting the vent line. It should be 13 or higher.
10. Go to step 5.

## 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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