Application Bulletin

CONTROLLING PHOSPHINE EMISSION WITH CENTAUR CATALYTIC CARBON

DESCRIPTION

An ongoing problem for most agricultural product storage facilities in warm climates is that of protecting their inventory from infestation and damage from insects. The most frequently used and effective method to combat this problem is to fumigate the storage facility as either a preventive measure or when the insect population reaches a predetermined level.

Phosphine is utilized in this process because it can achieve the necessary degree of pest control more effectively and with greater ease of handling than any other chemical. During the fumigation process, the storage facility must be sealed to prevent any air from leaking to the atmosphere. The concentration of phosphine necessary to fumigate the storage facility is determined by the facility's size. Metal phosphide strips are then placed inside the facility where they react with water already present in the air in the form of humidity. As a result, the phosphine is liberated and the necessary pest control levels are achieved. Afterwards, the facility is unsealed and ventilated for several days before normal operations resume.

HOW CENTAUR CAN HELP

Because phosphine is listed as a Hazardous Air Pollutant under the Clean Air Act, several states have enacted legislation regulating its use. Consequently, many companies that fumigate their storage facilities have begun to investigate technologies to treat the phosphine-laden air prior to releasing it to the atmosphere. Calgon Carbon's Centaur technology (patent pending) can successfully remove phosphine from air in fumigation applications. Centaur™ 4x6 catalytic adsorptive carbon can be used to convert the phosphine to non-toxic, strongly adsorbed phosphorous compounds. Centaur 4x6 is a vapor phase virgin activated carbon that has been manufactured to develop catalytic functionality. The product is unique in that it concentrates reactants via adsorption and then promotes their reaction on the surface of the pores. Centaur 4x6 is produced from bituminous coal using a patented process. Calgon Carbon provides a complete service approach for phosphine control utilizing vapor phase adsorption units which are designed to handle flows up to 1,200 cfm. The system pulls air from the storage facility through the carbon to ensure that there is no leakage into the atmosphere. The Centaur carbon reacts with the phosphine and, as a result, clean air is exhausted.

The graph below was developed from results of a pilot study on the removal of phosphine from air streams using Centaur. The study was performed over a period of more than thirty hours, which is similar to the length of the largest fumigation abatement operation. A typical fumigation operation would have an influent concentration ranging from 50-300 ppmv phosphine. However, the pilot study was run using a much higher influent concentration (500 ppmv phosphine), confirming the reliability of the results.

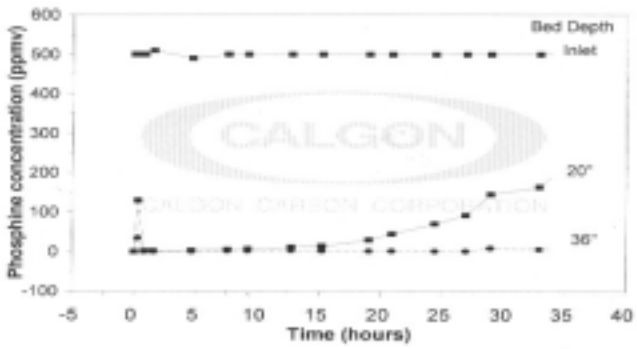
During the first few hours, an induction period takes place in which the Centaur becomes conditioned and the mass transfer zone is elongated. Due to this phenomenon, a larger bed depth of Centaur, typically 36 inches, is provided to prevent breakthrough in this initial phase. The breakthrough capacity was found to average 8% by weight across the entire carbon bed.

The Centaur carbon is then pre-treated for thermal reactivation, or in some cases, reused for phosphine removal. This technology has enabled Calgon Carbon to meet customers' expectations of cost-effective technology, convenience of operation, worker safety and pollution control.

For more information about how Calgon Carbon can help you utilize Centaur carbon for the control of phosphine emissions, please contact your local Calgon Carbon technical sales representative or call 1-800-4-CARBON.

PHOSPHINE REMOVAL USING CENTAUR

4x6 100 Feet Per Min, 80% Relative Humidity, Temperature 25°C



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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