

Information Bulletin

SAFETY PRECAUTIONS WITH ACTIVATED CARBON

Oxygen Demand Created by Activated Carbon in Confined Vessels

It has been confirmed that wet granular activated carbon confined in large vessels creates an oxygen demand which is hazardous to human health and can cause death unless proper safety precautions are taken.

Studies conducted in vessels have shown that *low oxygen content exists* in vessels containing wet carbon. Laboratory experiments conducted also have revealed that commercial activated carbons in a wet or moist condition will lower the oxygen content of an isolated space.

Preliminary indications of this research are:

- I The phenomenon occurs with wet activated carbon of all common types.
- II The rate of oxygen uptake naturally varies with the degree of exposure of the wet carbon to the air. Thus it is relatively rapid in a drained bed.
- III There is some indication of a limit to carbon's capacity for oxygen, but until more is known, it would be prudent to assume that all carbon (fresh, used, reactivated) will also exhibit this characteristic. Similarly, although these tests were run with water, it should be assumed that the phenomenon will occur in other liquid and vapor systems.

All confined spaces, including those containing activated carbon, should be presumed to be hazardous. Appropriate safety measures should always be taken before entering, as well as when workers are in, a confined space. OSHA regulations applicable to respiratory protection in oxygen-deficient atmospheres should be strictly adhered to.

Hazards with Certain Process Conditions

Activated carbon possesses catalytic properties and in use may generate a process off-gas by enhancing normally occurring decomposition or oxidation. Should off-gas (e.g. carbon dioxide, ethanol, or methane) be evolved, care must be taken to purge the gas from the adsorber on the supposition that it may be hazardous.

To avoid possible combustion of the carbon or the material being adsorbed, caution is recommended in contacting activated carbon with strong oxidizing agents, such as chlorine. Use with liquid oxygen and ozone is discouraged.

Need for Grounding of Carbon Systems

In certain systems, high voltage static electrical charges may accumulate to levels of shock or ignition hazard. As a precaution against possible ignition or shock, all carbon treatment systems should be adequately grounded.

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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