Charcoal biofilter cleans up fertilizer waste gases

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Removing the toxic and odorous emissions of ammonia from the industrial production of fertilizer is a costly and energy-intensive process. Now, researchers in Bangladesh have turned to microbes and inexpensive wood charcoal to create a biofilter that can extract the noxious gas from vented gases and so reduce pollution levels from factories in the developing world.

Writing in the International Journal of Environment and Pollution, Jahir Bin Alam, A. Hasan and A.H. Pathan of the Department of Civil and Environmental Engineering, at Shahjalal University of Science and Technology, in Sylhet, explain that biofiltration using soil or compost has been used to treate waste gases for the last two decades. There are simple filters for reducing odors and more sophisticated units for removing specific chemicals, such as hydrogen sulfide, from industrial sources.

Among the many advantages are the fact that biofiltration is environment friendly technology, resulting in the complete degradation by oxidation of toxic pollutants to water and carbon dioxide without generating a residual waste stream. It also uses very little energy. Biofilters are widely used in the developed world but their use in the developing world which is rapidly being industrialized but not necessarily considering pollution control.

The Shahjalal team has now built a prototype biofilter for ammonia extraction based on wood charcoal in which the nitrogen-fixing microbe

Nitrosomonas europaea has been grown. This microbe derives all its energy for metabolism, growth, and reproduction from ammonia, which it absorbs and oxidizes to nitrite. The microbe is commonly found in soil, sewage, freshwater, and on buildings and monuments in polluted cities.

The team found that their prototype biofilter could function at an ammonia concentration of 100 to 500 milligrams per liter of gas and remove the ammonia from this gas stream almost completely. Approximately 93% removal of ammonia gas was seen within seven days.

More information: "Study on the kinetics of NH3 removal from air by Nitrosomonas europaea" in *Int. J. Environment and Pollution*, 2010, 43, 51

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