

## **Benefits of Using BIONOXSOLVER™ NOx Scrubbing Solution over Sodium Sulfide/Hydrosulfide Reagents**

NOx scrubber installations employing Bionomic Industries' BIONOXSOLVER™ have proven to be simpler, safer and considerably more cost effective than systems using sodium sulfide or hydrosulfide scrubbing reagents.

Sodium sulfide and hydrosulfide are DOT labeled hazardous compounds that require dealing with major worker safety issues. They are extremely corrosive causing difficulties in safe handling and requiring full worker personal protection. Special elaborate procedures must be put in place and followed for proper storage and disposal of sulfide/hydrosulfide containers. BIONOXSOLVER on the other hand is much safer to handle, is not considered a hazardous substance and eliminates the complexities and safety issues of sulfide based reagents. BIONOXSOLVER customers' have time and time again remarked about the safety advantages and ease of handling and storage of BIONOXSOLVER at their facilities.

Using BIONOXSOLVER results in a much simpler and overall less costly system. NOx scrubber systems employing sulfide/hydrosulfide chemistries are more elaborate, complex and expensive to purchase, operate and maintain. Liberation of extremely toxic and dangerous hydrogen sulfide gas is always an issue. A costly additional scrubber stage along with the associate chemical feed systems, instrumentation and controls must be installed to scrub out any liberated hydrogen sulfide gas. Hydrogen sulfide worker exposure limits for NIOSH compliance is an extremely low 10 ppm for 10 minutes. Besides worker safety issues and potential liability exposure, hydrogen sulfide is extremely odorous at low concentrations. If it is emitted from the liquid solution or scrubber outlet it can cause neighbor odor complaints and the resultant possibility of costly fines. Not only is an additional scrubber stage required to remove the hydrogen sulfide but further chemicals must be purchased, stored and used in this scrubber stage. The chemicals consisting of sodium hypochlorite, considered hazardous in itself must be used in combination with sodium hydroxide. In this stage any deviation from maintaining a narrow PH scrubbing liquid range will cause liberation of toxic chlorine and hydrogen sulfide gases. The scrubbing liquid blow-down with residual sodium sulfide/hydrosulfide from the first scrubber stage must also be treated with sodium hypochlorite. This requires an additional water treatment step, thereby increasing costs and chemical usage. When analyzing the overall costs of a sulfide based system, the price for treating the waste liquid must also be taken into account.

If any sulfide or hypochlorite comes in contact with an acidic effluent stream dangerous hydrogen sulfide and chlorine gas will accumulate in the pipeline creating a dangerous explosive mixture.

BIONOXSOLVER is simpler and easier to use. Unlike flake sodium sulfide, BIONOXSOLVER is supplied in ready to use liquid form eliminating the need for an additional reagent preparation step for chemical mixing and dissolving. Although sodium sulfide as hydrosulfide can be delivered in liquid form, severe drawbacks remain as the liquid is extremely difficult to seal and pipe joints are prone to leakage of this hazardous corrosive compound.

BIONOXSOLVER scrubbing liquid discharge is environmentally friendly. As a case in point, the Puget Sound in the northwestern United States is extremely sensitive to waste water discharges that can harm aquatic life. Strict discharge limits have been set by the state environmental departments to protect this sensitive body of water. Obtaining discharge permits is extremely difficult. Due to the environmentally friendly make-up of BIONOXSOLVER, several customers' in that area were able to obtain the necessary discharge permits in a reasonable amount of time. Also in contrast to sulfide chemistry, BIONOXSOLVER users' have reported no interference with precipitation or recovery of metals in waste treatment processes.

For further information regarding how BIONOXSOLVER™ NOx Scrubbing Solution can benefit you, please contact us by phone at 201-529-1094, e mail [sales@bionomicind.com](mailto:sales@bionomicind.com), or website: [www.bionomicind.com](http://www.bionomicind.com).