

ActiGuard® AAFS50

PROMOTED ACTIVATED ALUMINA FOR ARSENIC AND METALS REMOVAL

INTRODUCTION

ActiGuard® AAFS50 is a patented iron enhanced activated alumina initially created to increase the uptake capacity of arsenic onto activated alumina. It has gone beyond the application to include fluoride, phosphate, silica, zinc, copper, lead, selenium and mercury.

Arsenic is identified as an obvious health hazard, mandating lower arsenic levels in all forms of water. The identification of this problem precipitated new regulations lowering the Maximum Concentration Level (MCL) from 50 ug/l (ppb) to less than 5 ug/l (ppb).

Activated alumina has been considered as an arsenic removal best technology for decades. It is still utilized as the most cost effective in certain applications. The need for better uptake capacity, no hazardous disposal issues and simple application called for a new product. ActiGuard AAFS50 was created to meet these demands providing three times the arsenic uptake capacity as standard activated alumina.

APPLICATIONS

- **Potable Water:** Removes both arsenic and fluoride from simple hand pump applications to municipal water systems. It is also employed at mineral water and water bottling facilities around the world.
- **Storm Water:** Currently removing elevated levels of phosphate copper, zinc, lead from run off at metal recycling centers, landfills, galvanizing yards, marine applications, and roof drainage. The high uptake capacity for phosphate has it being utilized to protect our lakes and waterways.
- **Mining and Smelting Water:** Water collected naturally and after stamping often have high levels of metals including arsenic. ActiGuard AAFS50 is employed to bring elevated levels back into compliance.
- **Oil and Gas Production:** Oil field brine water with high selenium level is being brought into compliance. Refineries with fluoride issues use ActiGuard products. Mercury is now also being addressed.

PRODUCT BENEFITS

ActiGuard Water Treatment Products are adsorbents which remove undesirable elements from water by adsorption. Axens Products with its unique properties including high surface area, and varied adsorptive sites are the perfect choice for potable water purification and industrial process water remediation.

- **Multiple Applications:** ActiGuard AAFS50 is currently being used to remove arsenic, fluoride, phosphate, copper, zinc, silica, lead, selenium and mercury.
- **Cost Effective:** Success has driven the most cost effective treatment per 1,000 gal. of water treated. The study done by the Arizona Dept. of Environmental Quality demonstrates that ActiGuard AAFS50 is the most cost effective arsenic removal technology in their region. Effective performance coupled with low cost media makes it the right choice for multiple applications.
- **Robust in Service:** Media is robust and stands up to the rigors of treatment. It does not break down or foul as other media is prone to do, necessitating numerous backwash cycles. The only backwashing required is normal maintenance to protect from channeling and thus maintaining the contact time.
- **Ease of Disposal:** Media may be disposed of at a municipal land fill or may be able to be collected for the alumina value. It passes both the Toxicity Characteristic Leaching Procedure (TCLP) and California Waste Extraction Test (WET).
- **pH Stability:** Neutralized to eliminate pH spike in storm water applications.
- **Certification:** NSF61 approved and meets EU criteria for potable water.

EXPERIENCE AND EXPERTISE

All waters are different and effectiveness of ActiGuard AAFS50 will be determined by what is present in your unique water. Models have been developed and validated by projects over more than a decade. Once a model has indicated that we can provide cost effective treatment, we will perform

equilibrium jar tests to validate the model with your water in contact with our media. Our work has assisted in identifying competing factors and the most cost effective application of our products.

- **Inlet Contamination Level:** The higher the concentration of targeted element, the more driving force, the higher the uptake capacity.
- **pH Level:** Greatly influences the surface charge and hence the uptake capacity of the media. We have identified the various optimum conditions for the various elements. Arsenic performs the best between 5.5 and 6.5 pH.
- **Contact Time:** Five minutes empty bed contact time provides the best balance of adsorptive capacity and capital cost.
- **Competing Ions:** Competing ions and the concentration thereof can greatly affect the ion exchange process. We have identified which ions, at what levels have an adverse effect and have identified whether we can circumvent them. Example: Silica above 20 mg/l will limit the arsenic uptake capacity of ActiGuard AAFS50 especially with a 7 – 9 pH level. The effects can be greatly reduced and cost effective treatment achieved by lowering the pH to between 5.5 and 6.5.

SYSTEM DESIGN

Single pass and lead lag arrangements are usually used for this adsorptive process. Simple systems make applications from hand pump to large municipal and large flow industrial applications feasible.

The lead lag design (in series) allows swing operation which is the most cost effective and safest configuration to ensure water remains in compliance for continuous operation. Operators can use the lead column to full saturation of the ActiGuard AAFS50, running the lag column while performing the adsorbent change out. The lag column then becomes the lead until saturation repeating the process. The system can be designed to utilize many columns, best suited to accommodate the water purification requirement. Storm Water Systems utilize both passive and pump systems and various contact time levels.

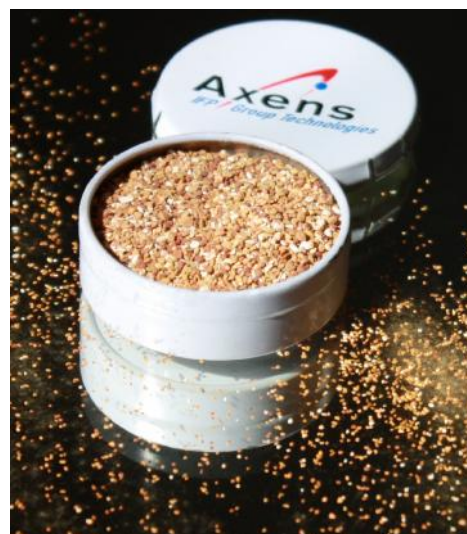


Figure 1: ActiGuard AAFS50

COMMERCIAL EXPERIENCE

ActiGuard Water Treatment Products are in successful operation worldwide, and some organizations approved and certified our adsorbents:

ActiGuard AAFS50 is certified by NSF/ANSI Standard 61 for drinking water treatment plant applications.

The Arizona Department of Environmental Quality identified ActiGuard AAFS50 as the most cost effective technology for arsenic reduction.

ActiGuard AAFS50 is being and has been utilized for various EPA (United States Environmental Protection Agency) superfund sites for remediation application. A Superfund site is an uncontrolled or abandoned place where hazardous waste is located, possibly affecting local ecosystems or people.

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