

Summary

Some highlights of the system include:

- 1) The system can be adapted as a passive or semi-passive system.
- 2) The pH is more stable in the BDAS treatment system than in dosing systems.
- 3) 100% removal of divalent and trivalent metals.
- 4) Up to 10% removal of Mg, Cl and Na.
- 5) Sulfates precipitates as BaSO_4 , that has the potential to be sold and thus will lower costs.
- 6) The BDAS technology is an improvement of the previously showcased DAS technology which is already running as a cost effective, full scale commercial plant.
- 7) The data in this brochure was obtained from pilot plants, which demonstrate industrial compatibility.
- 8) Toxicity tests and waste characterization tests proved that the treatment does not yield toxic waste.
- 9) The BDAS system is compatible with other treatment systems like Reverse Osmosis (RO), Ion Exchange or passive engineered wetlands which can be added to optimize desired water quality.
- 10) The BDAS remove between 25 to 50% of hardness, conductivity and TDS, thus making BDAS a very effective integrated treatment for heavily polluted water.

About UFS/TIA SAENSE PLATFORM

The SAENSE Platform (Sotho for “Science”) deals with Screening Applications and Exploring Novelty in Specialized Environments by studying the novel South African microbial diversity that gave rise to incredible functionalities that can be used to deal with contaminants.

Contact us

To learn more about BDAS and other exciting sustainable water treatment solutions, please contact Prof. Esta van Heerden

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BDAS is an effective and sustainable treatment for mine drainages or decants.

SAENSE PLATFORM

BDAS (Barium Carbonate Disperse Alkaline Substrate) Passive Water Treatment

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Introduction

Through the joint effort of mining companies, the UFS/TIA (University of the Free State and the Technology Innovation Agency) SAENSE Platform, an effective treatment system has been developed to treat Mine Drainages (MD). The system successfully treats the major contaminants found in acid, alkaline or neutral mine wastewater. The efficacy and applicability of the research has been demonstrated on several sites where the team constructed pilot plants to meet each client's site specific needs. This patented technology can treat 500 mega litres of MD to an outflow water quality that is accepted by the South African National Standards (SANS) 241:2006 & 2011 regulation for drinking water as well as Resource Water Quality Objectives (RWQOs).

This treatment uses barium carbonate supported on a wood shaving matrix. This allows for an effective "display" of the chemically reactive material to facilitate the precipitation of pollutants and a controlled release of the water to meet compliance objectives. The Barium carbonate Dispersed Alkaline Substrate (BDAS) system is the first system that completely removes sulfate and trace metals such as iron, while lowering electrical conductivity, salinity and total dissolved solids (TDS) and restoring alkalinity and pH. This is patented technology (National patent number P49198ZAPO and International patent number PCT-IB2015-056760).

Two Case studies

Case study 1

Passive gravitational flow pilot plants

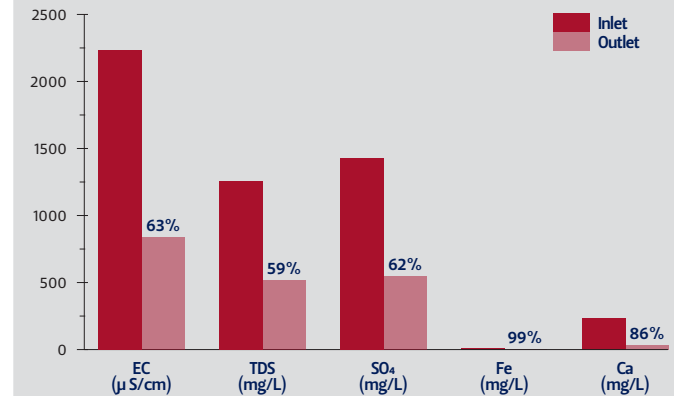


The BDAS system has demonstrated the capacity to remove up to 90 % of sulfate, 98 to 99% of iron and 90% of calcium in this system. The treatment is even effective in the removal of: Sr (92%) > Mg (22%) > K (8%) - Na (8%). The Ba values (0.1 mg/L) never exceed the limits of SANS drinking water standard (0.7 mg/L) while the EC and TDS decreased between 25 to 30%.

Case study 2

A second pilot scale was built at another coal mine and similar results were obtained. This demonstrates that the plant and its performance are reproducible. Toxicity tests were performed on the effluent water and inert matrix.

The data indicates that neither the effluent nor the solid wastes are toxic to the environment.



The following table shows the toxicity test results and risk classification of the BDAS system.

Results	Wastes Leachate
EC (Electrical Conductivity)(mS/m)	7.3
Dissolved Oxygen (ml/l)	9.3
Toxicity (EC/LC 20 and EC/LC 50)* V.fischeri (bacteria)	Not toxic
P.reticulata (guppy)	Not toxic
Estimate safe dilution factor (%) [for definitive testing only]	100
Overall classification Hazzard class***Weight(%)	Class 1 - No acute chronic hazzard 0%

*EC - Effective Concentration

*LC - Lethal Concentration