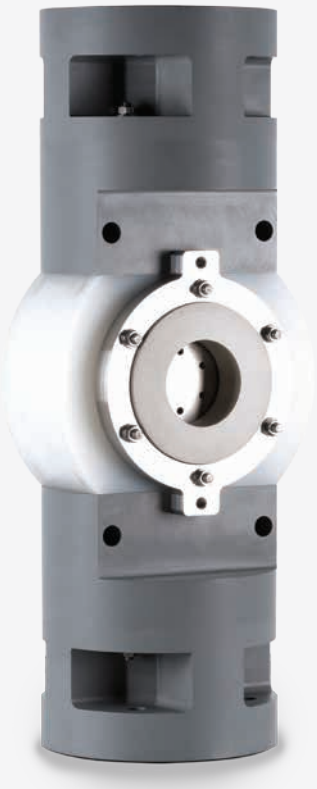
Diamox



A SIMPLE SOLUTION FOR THE TOUGHEST WASTEWATERS

Diamox is a compact and easy-to-implement electrochemical advanced oxidation reactor that provides on-site wastewater treatment systems with game-changing efficiency and simplicity.

elementsix™
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PERFECTING A TECHNOLOGY THAT TRANSFORMS WASTEWATER TREATMENT

Diamox diamond electrode cells use proprietary solid boron doped diamond (BDD) to give small to medium volume wastewater treatment systems a transformative increase in efficiency and capability.

Diamox electrochemical cells enable manufacturers of on-site wastewater treatment systems to design solutions that:

– Effectively treat effluents that are difficult or impossible to treat by conventional means, by fully mineralizing dissolved organic compounds

– Allow discharge of treated water directly from site

– Are cost effective and simple to operate and maintain

– Avoid the need to use UV and chemicals

– Meet the needs of key industries such as chemical, pharmaceuticals, oil and gas, textiles and environmental water management

DELIVERED READY TO INSTALL

Diamox is a complete 'bolt-in' unit comprising a Diamox cell with solid BDD electrodes, housing and all electrical and pipework connections - ready to install into Electrochemical Advanced Oxidation Process systems.

Diamox has proven reliability and is easy to integrate into your water treatment technology.

Diamox contains a stack of bipolar BDD electrodes to maximize the effluent's exposure to oxidizing species generated at the electrode surface.

DIAMOX: THE BREAKTHROUGH THAT MAKES ELECTROCHEMICAL ADVANCED OXIDATION PROCESS (EAOP) SYSTEMS EFFECTIVE, RELIABLE AND ECONOMICAL

Conventional treatments use aerobic biological processes to digest contaminates dissolved in waste water. Highly contaminated effluent streams pose a challenge for these processes since the dissolved species can be resistant to oxidation (recalcitrant), and can be toxic to the microbial colonies in a bio-digesting plant.

Advanced oxidation processes (AOPs) provide an on-site solution for these challenging waste streams. They function by mineralizing dissolved effluents through oxidation reactions with hydroxyl radicals.

THE POWER OF THE HYDROXYL RADICAL

The hydroxyl radical ($^{\bullet}OH$) is the neutral form of the hydroxide ion (OH^-). Hydroxyl radicals are highly reactive, able to oxidize even the most recalcitrant and toxic dissolved effluent species.

EXTENDING ELECTRODE LIFE FOR YEARS

Conventional electrodes dissolve in the presence of the hydroxyl radical giving them a limited field life. Element Six Electrochemical Processing (EP) Grade BDD electrodes are resistant to the hydroxyl radical and have a field life measured in years – enabling EAOP systems that are efficient and reliable.

COMPLETE TREATMENT WITH A SINGLE ELECTROCHEMICAL PROCESS

AOP systems usually require additional UV and chemical processes to generate the hydroxyl radical and that makes them more complicated to operate, more hazardous and less sustainable. Electrochemical AOP systems with long life Diamox electrodes can generate the hydroxyl radical solely by electrochemical means to treat highly contaminated water; for a system that is less complicated, safer and easier to operate.

A PROVEN TECHNOLOGY FOR BETTER SUSTAINABILITY IN MANY INDUSTRIES

ENABLING EFFICIENT ELECTROCHEMICAL ADVANCED OXIDATION PROCESSES

Diamox is a game changing electrochemical cell for Electrochemical Advanced Oxidation Process (EAOP) water treatment technology since it is able to operate at extremely high current density, with 100% of the hydroxyl radicals generated available for useful oxidation work.

EFFECTIVE - capable of full mineralization of dissolved organic compounds

RELIABLE - using Element Six BDD electrodes that have a field lifetime measurable in years

FLEXIBLE - effective with most types of effluent streams with dissolved contaminates

COMPACT FOOTPRINT

SAFE - operates at low temperature and pressure without the addition of hazardous chemicals

PROVEN PERFORMANCE IN A VARIETY OF WASTE STREAMS

Successful results have been achieved in complex waste streams including:

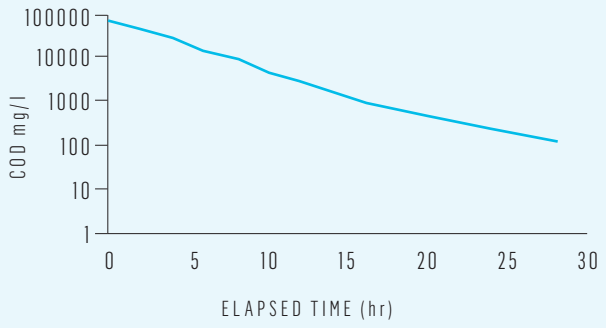
– High Chemical Oxygen Demand (COD) streams of >100,000 mgl^{-1} to <200 mgl^{-1} landfill leachate

– Phenolic compounds

– Mercaptans

– Dyes

EXAMPLE OF COD REDUCTION IN A BATCH PROCESS



COD reduction of dissolved recalcitrant.

A TREATMENT SOLUTION FOR MANY INDUSTRIES

Diamox is suitable for use in low to medium volume wastewater treatment systems in a wide range of industries, such as:

– Spent caustic wastewater

– Textile wastewater – dye de-colorization

– Pharmaceutical wastewater

– Reverse Osmosis brines

– Landfill leachate including ammonia reduction

Diamox enables on-site EAOP processing in multiple industries including pharmaceutical, textiles, landfill leachate and oil & gas.

A TURNKEY SOLUTION READY FOR IMPLEMENTATION

TECHNICAL SUPPORT

Element Six has more than 20 years' experience in the research, development and manufacture of CVD diamond technology for applications that range from electrochemistry to optics.

Element Six is able to provide:

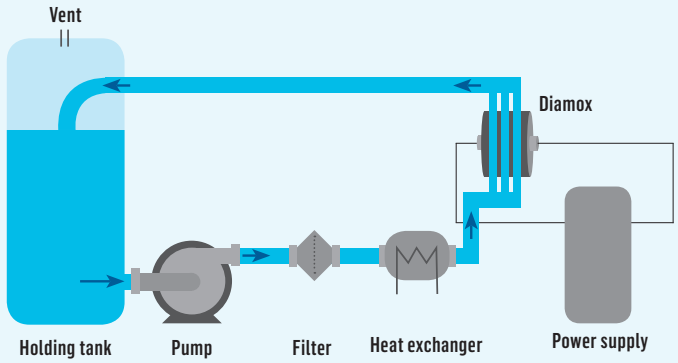
- Expert assistance to ensure our clients maximize their technological potential
- Co-development capability to solve application problems
- Mapping of the oxidation capacity of Diamox over a range of effluent contamination concentrations

TECHNICAL SPECIFICATIONS FOR DIAMOX 20C

Electrodes	Element Six EP Grade BDD
COD Oxidation Capacity	2 kg per hour
Water Connections	4 inch Van Stone flange
Power Connections	175 mm^2 flexible cable with terminal connector
RECOMMENDED POWER SUPPLY	
Bipolar DC Power supply	120 to 250 kW
Polarity Switching	60 seconds
Operating current	250 - 375 amps
Voltage range	120 to 660 V DC
RECOMMENDED OPERATING CONDITIONS	
Effluent Conductivity	>20 $mScm^{-1}$
Operating pressure	1 to 3 bar
Recirculation flow rate	>25,000 litres per hour
Water exit temperature	50°C

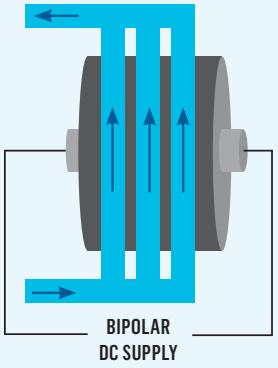
HOW DIAMOX FITS INTO EAOP TREATMENT PLANTS

EAOPs are compact and simple water treatment systems. The effluent is held in a process tank and then pumped through the Diamox cell. The oxidation process is a batch process with the dissolved effluents mineralized at the surface of the anode electrode and the process controlled by the power applied to the electrochemical process.



BIPOLAR ELECTROCHEMICAL CELLS

Diamox uses BDD for the anode and the cathode. The designed allows for switching the polarity of electrodes to prevent fouling, enabling operation in highly contaminated environments.



FIND OUT MORE ABOUT DIAMOX

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