PerOX 2

MINING SERVICE
WATER DISINFECTION

Environmentally Friendly
Chlorine free disinfectant

Technical brochure

PerOX$_2$ for mining service water disinfection is a strong disinfectant with a wide spectrum of antimicrobial activity which includes:

- Bacteria
- Yeast
- Mould
- Viruses

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$PerOx_2$ emerges as a game changer in mining service water disinfection

$PerOx_2$ Mining Service Water Disinfection is a strong disinfectant with a wide spectrum of antimicrobial activity, which includes bacteria, viruses, yeasts and moulds.

$PerOx_2$ can be used as a chlorine free alternative.

$PerOx_2$ is an oxidising agent with a strong vinegar like smell. The mechanism of action is the same as other oxidisers such as chlorine, bromine and iodine. It denatures proteins, disrupts cell wall permeability, and oxidises di-sulfur bonds in proteins, enzymes, and other metabolites.

$PerOx_2$ is a completely environmentally friendly disinfectant. When **$PerOx_2$** is dissolved in water, it disintegrates to **hydrogen peroxide** and acetic **acid**, which will further breakdown to water, oxygen and carbon dioxide.

$PerOx_2$ degradation products are found naturally in the environment.

Benefits

$PerOx_2$ is a powder and is easy to transport and store when compared to traditional oxidisers such as sodium hypochlorite, calcium hypochlorite and liquid peracetic acid.

$PerOx_2$ is transported and stored as a non-dangerous product resulting in big savings in transport and storage costs. The peracetic acid only forms once water is added to the **$PerOx_2$** powder, thus **$PerOx_2$** powder is a non-dangerous product.
5kgs of **$PerOx_2$** makes 227 litres of liquid peracetic acid at 2000 ppm.

$PerOx_2$ after dissolution in water, does not evolve and form pungent toxic gasses (HOCl).

$PerOx_2$ does not affect the pH of the water (acetic acid is a weak acid).

$PerOx_2$ is a safe and effective disinfectant - dilutions can be done from a stock solution of 2000 ppm resulting in a safer product for operators to use.

$PerOx_2$ has excellent stability in extreme heat storage conditions.
Refer to stability table.

$PerOx_2$ has good stability once hydrolysed.
Refer to stability table.

$PerOx_2$ is environmentally friendly and breaks down to water, oxygen, CO_2.

Recommended dosage

Recommended dosage of 2-4 ppm liquid peracetic acid from stock solution made up from **$PerOx_2$** powder.
Time of total dissolution of **$PerOx_2$** powder to make up a stock solution is 30 min.
$PerOx_2$ powder will yield a stock solution of 2000 ppm peracetic acid.
Storage stability: Refer to tables

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Stability of $PerOx_2$ in powder form in extreme heat conditions:

Stability Analysis of $PerOx_2$ powder stored at 50 Degrees Celsius for 3 months

Elapsed Days	Units	Accumulative weight Loss	Peracetic Acid	Hydrogen Peroxide
0	% w/w	0.00	2.1	6.1
91	% w/w	1.06	1.4	5.5

Peracetic acid formation of $PerOx_2$ after storage in extreme heat conditions:

Analysis of $PerOx_2$ solution made from powder stored at 50 Degrees Celsius for 3 months

Elapsed Days	Units	Solution	Peracetic Acid	ppm peracetic acid	Hydrogen Peroxide	ppm Hydrogen peroxide
0	% w/v	22.0 g/L	0.19	1900	0.05	500
91	% w/v	22.0 g/L	0.12	1200	0.05	500

Shelf life of $PerOx_2$ once hydrolysed for use:

Analysis of $PerOx_2$ solution 22 grams per litre made and tested over a 7 day period

Time	Units	Solution	Peracetic Acid %	ppm peracetic acid
Initial	% w/v	22.0 g/L	0.19	1900
30 min	% w/v	22.0 g/L	0.19	1900
1 hr	% w/v	22.0 g/L	0.19	1900
8 hrs	% w/v	22.0 g/L	0.17	1700
24 hrs	% w/v	22.0 g/L	0.16	1600
48 hrs	% w/v	22.0 g/L	0.12	1200
72 hrs	% w/v	22.0 g/L	0.09	900
Day 4	% w/v	22.0 g/L	0.023	230
Day 7	% w/v	22.0 g/L	0.022	220

- pH – 9.22 @25 Degrees Celsius
- Loss on drying 105 degrees Celsius 24 hrs = 1.34%

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Background

and traditional chemicals for disinfection

In the mining industry, maintaining underground water free of bacterial contamination is a critical challenge. The conventional method of disinfection, employing calcium hypochlorite or liquid sodium hypochlorite, relies heavily on human control for addition and flow regulation. This dependence often leads to difficulties in achieving continuous and adequate disinfection of mine water. Mine service water prevalent in all drilling site, is notorious for its unpalatable nature - containing high concentrations of dissolved solids, excess acidity or alkalinity, diesel fuel spillages, and various mining debris, resulting in an unpleasant odour.

To address hygiene concerns, drinking-water points are strategically placed near working areas. Despite instructions to drink potable water, mining personnel often disregard this directive, necessitating regulations to disinfect service water to potable water standards, ensuring freedom from fecal coli and low organism counts.

Previous studies, especially in warmer climates, have revealed the presence of disease-producing pathogens like salmonella strains and entamoeba hystolytica in service water. While these pathogens are more resistant to chlorination than E.coli, the latter is universally accepted as the indicator organism due to its prevalence in human, mammal, and bird excreta.

Alternative disinfection methods, such as ultraviolet light, have been explored, but chlorination remains the predominant practice. Gaseous chlorine, though permitted, poses severe toxicity and hazard concerns, leading to the preference for solid or liquid chemicals for safety and transport ease. These chemicals, upon dissolving in water, produce hypochlorous acid (HOCI), known for its potent disinfecting and bactericidal properties.

various chemicals, including sodium hypochlorite, chloride-of-lime, lithium hypochlorite, and granular calcium hypochlorite, are utilised, with the latter being the exclusive choice in most locations.

Despite widespread use, calcium or sodium hypochlorite, the predominant choices, face challenges. Difficulties in feeding the solid or concentrated solution at a constant rate, coupled with increased pH levels and scaling tendencies due to additional calcium, make it less than ideal for underground disinfection.