Manufactured in Germany

WATCH® WATER
WATCH WATER
a Water Company

RED-OXY TREATMENT
FILTRATION
ADSORPTION
FILTERSORB
INSTANT PRODUCTS
SYSTEMS

ACIDTRAPP®

Introduction

The current technologies for removing **ions** from **acidic** chloride and sulphate waste streams is precipitation with high dosage of sodium (Na) or potassium hydroxide. Although successful, there are so many inherent drawbacks to this precipitation techniques.

Magnesium Oxide Beads (MGO) in water ($K_{sp}=1.3x10^{11}$) has limited solubility in water and as a result of the common Ion effect, cannot generate a filtrate with a pH greater than 9.

Calcium ($K_{sp}=5.5x10^{6}$) will not coprecipitate as the **Mg(OH) + OH**. This is an important factor since all acidic chlorides and sulphate feeds to calcium carbonate or sodium carbonate contains significant amount of calcium, sodium and other salts raising the **TDS** to highest possible range.

Proprietary technology based on **MGO + H_2O = Mg(OH) + OH** (neutralization) with **$Mg(OH)_2$** produces a more and higher **filterable** precipitate because neutralization occurs as the **$Mg(OH)_2$** is dissolved by the acid no matter in form of water or gas. This slower solid beads/liquid reaction allows time for **Crystal Growth** to occur and produces large and easily filterable precipitates. This is a revolution.

On the other hand all older technologies used for **neutralization** of **acidic water** with dangerous and hazardous liquids with strong hydroxide yields numerous hydroxide or calcium and **sodium ions** in water or wastewater instantaneously forming a much larger volume of very tiny crystallity that result in gelatinous sludge and extreme high pH and TDS.

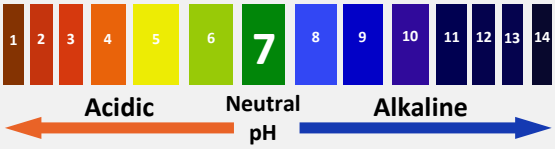
Magnesium Oxide Beads

AcidTrapp® (MGO) can neutralize at least three times more milliequivalents of H^+ per unit weight as compared to

A. Calcium carbonate ($CaCO_3$)
B. Sodium bicarbonate ($NaHCO_3$)
C. Magnesium carbonate ($MgCO_3$)
D. Sodium hydroxide (NaOH)
E. Potassium hydroxide (KOH)

and the **AcidTrapp®** is food grade with 99.9% purity.

MGO beads or **AcidTrapp®** also offers a safety advantage. It is a weak base, safe and easy to handle.



From a waste minimization perspective, AcidTrapp® offers many advantages.

First:

The **AcidTrapp®** adds Magnesium in drinking water. *(Click Special Magic Filter)*

Second:

The **AcidTrapp®** is added as a solid beads. This step eliminates the dilute water used as hydroxide solutions. Because the particle size of the precipitate is larger, more pollutants are caught in the **Crystolite** filter resulting in smaller amount of sludge and 100% better neutralization. No backwash is needed in up-flow process with no waste generation.

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DRINKING WATER TREATMENT WITH ACIDTRAPP®

Neutralization

Watch Water's proprietary **AcidTrapp®** is used for **pH correction** treatment that consists in adjusting the **pH** of a water which is **acidic**.

- Neutralizing various types of effluent before they are discharged into the natural environment: Acidic industrial effluent, acid mine drainage water without using chemicals (e.g. sodium, calcium, or potassium hydroxides.
- Protect distribution pipelines against corrosion (by encouraging the formation of protective pipeline passivation and avoid any scaling.
- The last point alone will be addressed in greater detail because it constitutes one of the major steps in **drinking water treatment**

Consumer Health protection

- Eliminating toxic corrosion inhibitors
- Protecting scale, especially caused by Calcite or calcium carbonate
- Eliminating the danger of toxic metals dissolution e.g. lead and copper
- Eliminating the risk of **redwater** at the tap (corroded cast iron or steel pipelines)
- Maintaining network (no leaks) protecting against corrosion that creates leakages and fractures. *(Click Corrtrapp)*
- Toxic gases (hydrogen sulphide) or all other gases at lower pH are more volatile. In other words they come out of the water more aggressively.
- At higher pH all **toxic gases** are neutralized
- At lower pH level chlorine causes higher amount of Disinfection by products (DBPs)
- **AcidTrapp®** makes **fresh drinking water** which is necessary for all life. Additionally, magnesium is the most valuable source of mineral for health.

"If the water consumption is sourced from water softener or Reverse Osmosis it must go through AcidTrapp treatment, only then it is safe for consumption"

Magnesium Based Adsorbent (Beads)

In all cases chemical precipitation is ever successful reducing metal concentrations in the wastewater to comply with discharge regulation, Additional treatments and technologies are required;

- Reverse Osmosis Membranes
- Ion exchange Resins
- Activated Carbon

are often employed to reduce the metal concentrations sufficiently for discharge. Our new approach to tertiary treatment is our proprietary **Beads, Magnesium** based adsorbent (**AcidTrapp®** or **MetalTrapp®**) that uses surface adsorption via ion exchange to remove metal ions from **mildly acidic** (pH 4.0) to mildly alkaline (pH 8.5) rinse water and plating baths, while simultaneously neutralizing the **acidic** components of the waste stream. There is no need for membranes and expensive chelating resins.

AcidTrapp® can be used as a polishing filter downstream of primary and secondary treatment to remove any trace soluble metals (<30 mg/l) and filter out the insoluble metals.

DRINKING WATER TREATMENT WITH ACIDTRAPP®

The **Spherical Adsorbent (MGO)** function as an inorganic **ion exchange** medium where **Mg^{++} ion exchanges** with a metal ion (M^{+x}) as shown in the following equation.

$$MgO_{\text{(adsorbent)}} + H_2O \longrightarrow Mg(OH)_{2\ \text{(adsorbent)}}$$

$$Mg(OH)_{2\ \text{(adsorbent)}} + M^{+2}_{\text{(aq)}} \longrightarrow M(OH)_{2\ \text{(adsorbent)}} + Mg^{+2}_{\text{(aq)}}$$

In this equation, the metal ion is shown as divalent, but any multivalent Ion can also be adsorbed provided the ion exists as a free cation in water or wastewater.

More on this technology please contact us or go to MetalTrapp

Acids to neutralize with MGO

- Hydrochloric Acid (HCL)
- Sulfuric acid (H_2SO_4)
- Phosphoric Acid (H_3PO_4)
- Nitrogen Oxides (NO_x)
- Nitric Acid (HNO_3)
- Hydrogen sulfide (H_2S)
- Carbon dioxide (CO_2)
- Sulfur dioxide (SO_2)

Chemicals Used for pH Adjustment

The most commonly used neutralization chemical for acid is

- ❑ 50% sodium hydroxide (NaOH)

In any case, this is not a good choice. To neutralize an **Acid** or **Base** a source of hydroxide ions (OH^-) or hydrogen ions (H^+) are required respectively. An acid must be neutralized with a base, which by definition is characterized by an excess of OH^- ions. Likewise, a base must be neutralized with an acid, which by definition is characterized by an excess of H^+ ions.

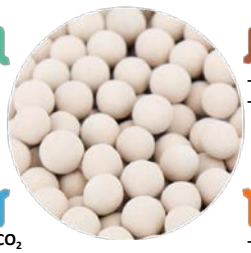
$$OH^- + H^+ = H_2O \text{ (pH 7)}$$

The most suitable product for **acid neutralization** must consider:

- Health and Safety
- Cost and Convenience

Only one product is safe i.e.

Spherical Magnesium Oxide Beads
Also known as Trappsorb and following



BARIUMTRAPP
- Removal of Barium

CORRTRAPP
- Passivation Technology
- Corrosion Prevention

CARBONTRAPP
- Capturing/Trapping of CO_2
- Converting into valuable Fertilizers

SILICATRAPP
- Removal of Silica

AcidTrapp® (Magnesium Oxide)

This unique media is most effective in neutralizing acids and has been invented by **Watch Water® Germany** and distributed by **Watch Water® Branches**. As with calcite, **AcidTrapp®** is also much easier to use. This means that in a poorly designed system **AcidTrapp®** (MGO) will not raise pH above a pH of 9.0 and is very safe to use. Additionally, with its purity, it is non-toxic and certified to **NSF/ANSI/CAN 60 - 2018** drinking water standards.

"Lower pH increases the risk of mobilized toxic metals absorption"

Causes of Low pH in water

- Several organic matters in the carbon dioxide (CO_2) is released when they decompose, and it forms the carbonic acid (H_2CO_3) as it combines with water $CO_2 + H_2O = H_2CO_3$. As H_2CO_3 is an acid and it lowers the pH of water.
- Chemicals in the water released by industries or individuals. Industrial effluents that are released in the environment, are required to have a neutralization system.

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PRODUCT INFORMATION

Causes of Low pH in water

- Acid precipitation, acid rain occurs when carbon dioxide (CO_2), Nitrogen oxide (NO_x) and Sulphur dioxide (SO_2) in the air are combined with water vapor. They are the products of car fumes and emissions from coal-fired plants.
- High chlorine levels also decreases the pH of drinking water, making it more acidic. The more acidic the water, the higher the **corrosion level**. **MGO** beads destroy chlorine and corrosion both.
- When chlorine (Cl_2) is added to the water (H_2O), it **hydrolyses rapidly** to produce hypochlorous acid (HOCL) and the hypochlorous acid will then dissociate into hypochlorite ions (OCL) and hydrogen ions (H^+). Because hydrogen ions are produced, the water will become more acidic. (The pH of the water will decrease) and the water is not safe for drinking.



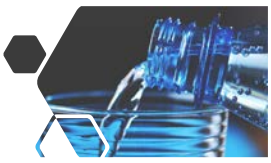
Physical Properties

Appearance	Off-white
Bulk density	1.300 kg/m³
Mesh Size	2 – 5 mm
Packaging Standard	28.3 liter/bag Big Bags available on Request
Service velocity	10 m/h
Backwash velocity	28-30 m/h (for down-flow)
Certification	NSF/ANSI 60

Advantages of MGO Beads

Advantages	Watch Water MGO Beads	Calcite($CaCO_3$)
Provides Magnesium as a micro-nutrient	Yes	No
Does not Cause Scaling Problems	Yes	No
Long lasting (buffered) Alkalinity & pH control	Yes	No
Long lasting corrosion control	Yes	No
Heavy Metal Precipitation	Yes	No
Radionuclides Precipitation	Yes	No
Easy and safe to handle Non-Hazardous & Non-Corrosive	Yes	No
Environmentally non-toxic	Yes	No
Very safe for the environment	Yes	No





Conditions for Operations

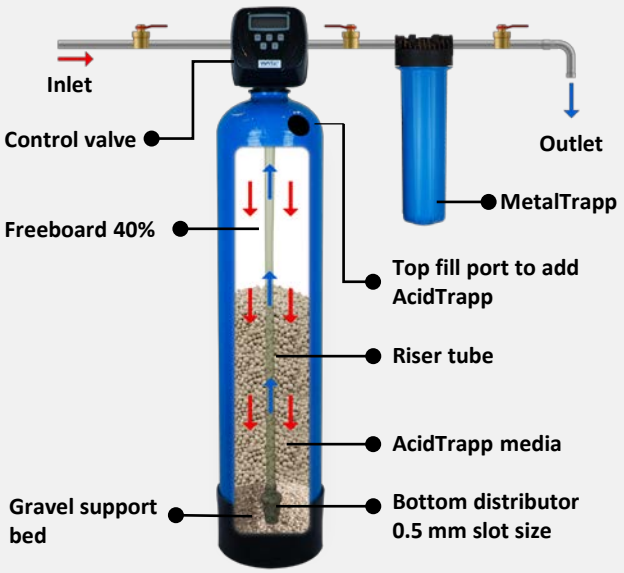
Systems can be designed according to customer's choice, Down-Flow or Up-Flow.

- Use distributors designed for filtration to avoid pressure drop. We recommend 0.5 mm slot.
- A gravel support bed is recommended.
- Water pH range 4 to 6.5.
  - Minimum 60 cm (24 inches)
  - Maximum 80 cm (30 inches)
- Freeboard 40% (Down-flow)
  - Backwash frequently to prevent pressure drop.
- Freeboard 20% (Up-flow)
  - No Backwash

SYSTEMS INFORMATION

Downflow Automatic System

- Freeboard 40%
- Bed Depth: 65-100 cm
- Service velocity: 25 m/h
- Backwash velocity: 28 m/h
- Gravel approximate 5% tank volume

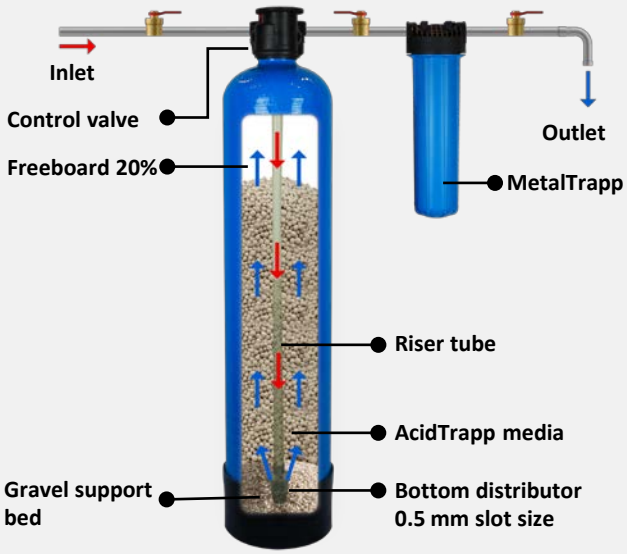


Pressure Vessel			AcidTrapp Media				Service flowrate		Backwash	
Tank	Tank Volume (liters)	Freeboard (%)	Volume (%)	(liters)	Ft³	Bed Height (cm)	m³/h	gpm	m³/h	gpm
10x44	48	40	55	28	1	65.19	0.7	3.08	1.41	6.20
13x54	103	40	55	56	2	74.57	1.4	6.16	2.39	10.52
16x65	170	40	55	84	3	81.57	2.10	9.24	3.63	15.98
18x65	250	40	55	140	5	92.45	3.5	15.41	4.59	20.20
21x60	309	40	55	170	6	83.84	4.25	18.7	6.25	27.51
24x69	436	40	55	224	8	90.04	5.60	24.65	8.1	35.66
30x72	712	40	55	392	14	100.68	9.80	43.14	12.76	56.18
36x72	1072	40	55	590	21	100.65	16.52	72.73	18.38	80.92

Attention: Not for human consumption. Keep away from children's reach.

Acidtrapp Upflow System

- Freeboard: 20%
- Bed Depth range: 63-124 cm
- Service velocity: 25 m/h
- No backwash
- Pressure: 3-6 bar
- Gravel approximate 5% tank volume



Pressure vessel			AcidTrapp Media				Service flowrate	
Tank	Tank Volume (liters)	Freeboard (%)	Volume (%)	(liters)	ft³	Bed Height (cm)	m³/h	gpm
10x35	39	20	75	28	1	63.82	0.7	3.08
10x44	48	20	75	36	1.3	83.82	0.9	3.96
10x54	61	20	75	45	1.6	101.18	1.12	4.93
12x48	76	20	75	56	2	89.83	1.40	6.16
12x52	84	20	75	64	2.3	100.63	1.6	7.04
13x54	103	20	75	78	2.8	103.86	1.95	8.58
14x52	122	20	75	92	3.3	99.60	2.3	10.12
14x65	140	20	75	105	3.75	123.82	2.62	11.53
16x65	170	20	75	129	4.6	125.28	3.22	14.17
18x65	250	20	75	188	6.7	124.15	4.7	20.69

Beware of fake products

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