

# MG-Coated Activated Carbon

# CATALYTIC CARBON MG<sup>+</sup>

## Introduction

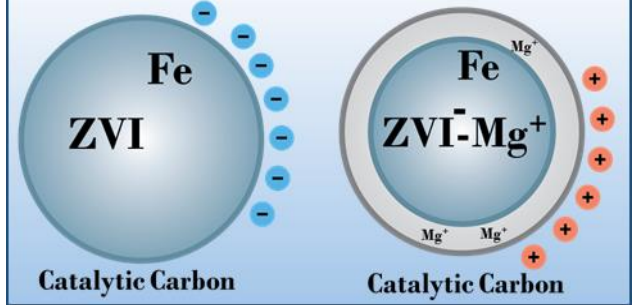
**Perfluorinated compounds (PFCs)** are a new class of **persistent organic pollutants**. They consist of a hydrophobic perfluorinated carbon tail and a hydrophilic ionic head. Due to the unique structure of **fluoride-carbon bond**, they present significant thermal and chemical stability. As a result, there is

### No PFCs Biodegradation

Not even one conventional biological treatment of water or waste water is applicable so far. Filtration techniques such as nanofiltration and reverse osmosis have shown massive destruction in the environment with membrane concentrate and as well as adding massive overall management costs.

**Watch Water**<sup>®</sup> **adsorption** treatment technologies including **SuperOxy** is an **Advanced Oxidation Processes (AOPs)**, photolysis and use of **Zero Valent Iron (ZVI) activated carbon** with **MGO** surface is the solution for direct degradation of **PFCs** and removal of **PFOA** equal to 95% using sulfate radicals and photolysis of regenerated concentrate. **SuperOxy** can effectively degrade **perfluorocarboxylic acids (PFCAs)** to fluoride ions and carbon dioxide. In recent years **Catalytic Carbon (ZVI)** has emerged as one of most innovative technology for the removal of most difficult environmental pollutants through reduction regeneration mechanism. The high reactivity of catalytic carbon is due to the high surface area and its very high **negative (-)** surface for cation's. For this reason, **Watch Water**<sup>®</sup> has created a new stable **adsorber** by attaching stabilized molecules onto ZVI particles **MgZVI/AC**.

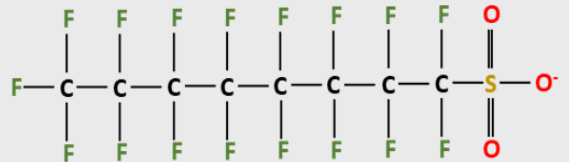
## Graphical Abstract



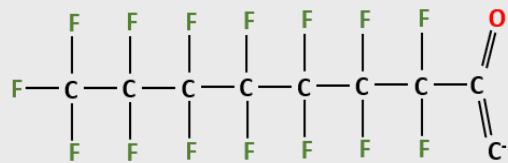
## Some PFCs and their Chemical Structure

### Compound

**Perfluorooctanoic Sulfonate Acid (PFOS) C<sub>8</sub>F<sub>17</sub>SO<sub>3</sub>H (>98%)**



**Perfluorooctanoic Acid (PFOA)**

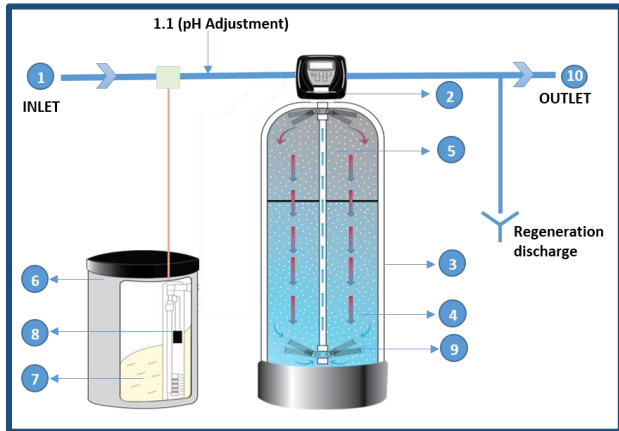


Only **Catalytic Carbon (ZVI)** coated with a cationic surface modification can remove **Halogenated Organic Compounds**.



# ADSORPTION AND RECOVERY

## Catalytic Carbon-MG System



1. Inlet ½" up to 3" (1.1 pH adjustment)
2. Head Automatic with Regeneration
3. Pressure Vessel
4. **Catalytic Carbon MG**
5. Free board 30%
6. Brine Tank for **SuperOxy**
7. Brine solution 1% (1 liter **SuperOxy** brine for each liter **CC-MG**)
8. Brine Valve
9. Bottom distributor slot 0.5 mm
10. Outlet

### Adsorption and Recovery

An adsorption process of **Catalytic Carbon MG** has extremely high adsorption capacity of C<sub>2</sub>-C<sub>6</sub>-C<sub>8</sub> fluorine-containing compounds and can be adsorbed without any morphological change. Therefore by the use of adsorption **Catalytic Carbon MG**; and desorption process using **SuperOxy** all adsorbed substances can be recycled or destroyed using solar energy. Water or wastewater containing C<sub>2</sub>-C<sub>6</sub>-C<sub>8</sub> fluorine-containing compounds is passed through a pressure vessel with the catalytic carbon MG to adsorb **PFOA, PFHA & PFOS** and the water at outlet is **without** fluorine-containing compounds.

The **Catalytic Carbon MG** having the adsorbed fluorine-containing compounds can be regenerated up to 5 years so as to desorb the Fluorine-Containing-Compounds.

Catalytic Carbon MG features two mechanisms that work rapidly and remove PFOA, PFOS and many other per-fluorinated (PFAS) compounds from contaminated water supplies. This is absolutely a new process **Catalytic Carbon MG + SuperOxy** to regenerate carbon's. Catalytic Carbon MG can remove 97% of PFOA and PFOS from an initial concentration of as low as 0.5 ppb in only 4 to 5 minutes.

The Regeneration time may be generally from 45 minutes to 1 hour

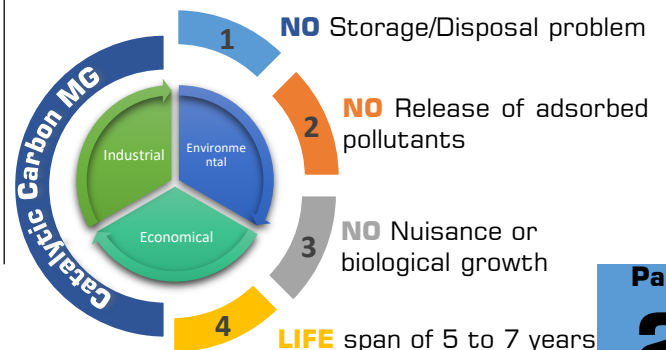
#### For Example

Backwash ----->	5 Minutes
Brine Solution----->	30 minutes
Slow Rinse ----->	10 minutes
Fast Rinse ----->	5 minutes
<b>Total Time -----&gt;</b>	<b>50 minutes</b>

## Regeneration

Regeneration with **SuperOxy** means reactivation of **adsorber** and destruction of adsorbate with strong **Oxidation**. Regeneration can be explained as combination of **Desorption** and Activation of adsorber with **SuperOxy**. Regeneration process can be carried onsite and using **SuperOxy** any Adsorber or any Activated Carbon can be reactivated for multiple uses. **SuperOxy** has solved the problems of discarding spent adsorbents.

## Benefits of Regeneration





# CATALYTIC CARBON MG APPLICATIONS

## Drinking Water Applications

### Point – of – Use Water Treatment

The high capacity of our **Catalytic Carbon MG** adsorber makes it ideal for POU applications that can remove **PFOA and PFOS**, pesticides such as atrazine and chlorpyrifos, organic synthesis such as bisphenol (BPA), as well as hundreds of Pharmaceuticals compounds. **CC-MG** can be easily integrated into all major categories of POU water filters like faucet mounted, counter top, under the sink and table pitcher products.

### Residential and Commercial Water Treatment

Drinking water treatment systems based on Activated carbons at residential and commercial applications are unable to remove micropollutants and harmful perfluorinated compounds from the drinking water facilities. **CC-MG** adsorber offer an easy and **cost-effective** way to help bringing healthy and clean water to all **residential and commercial applications**.

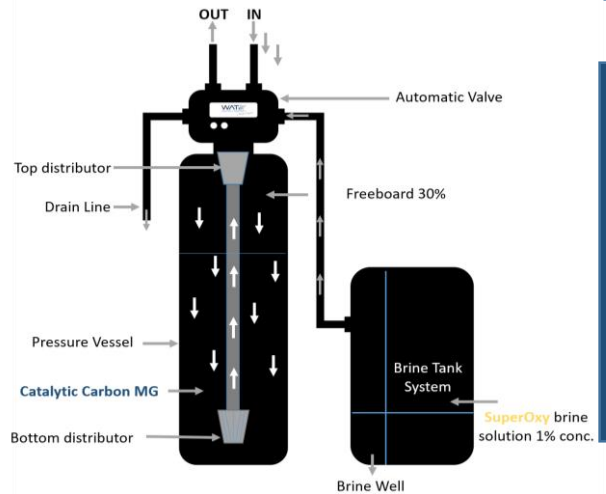
### Municipal and Community Water Treatment

The Mobility, Persistence and widespread use of perfluoroalkyl and polyfluoroalkyl substances (PFAS) have resulted in all municipal and community drinking water systems globally. PFAS were found in the drinking water of more than 1.6 billion citizens in 70 countries and a recent analysis indicates that **PFAS** – contaminated drinking water is much more widespread than previously reported. These chemicals are “**All-over**” and “**Forever**” around us. These toxic chemicals are contaminating everything from food and drinking water even the air around us.

**Catalytic Carbon MG** can be used all type of applications like **Municipal and Industrial**



Residential



Commercial



Industrial

### Catalytic Carbon can remove PFASs

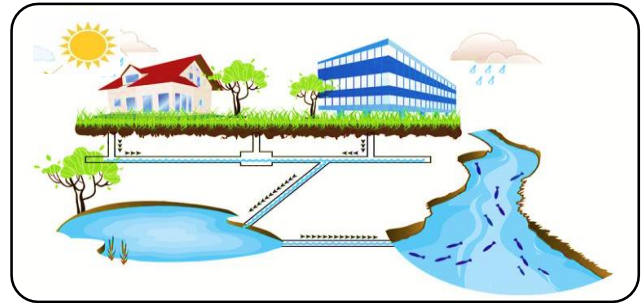
**PFOS and PFOS** can be removed by up to 99% using **Catalytic Carbon MG**.





## TREATING DRINKING WATER WITH CCMG+

- a { Perfluorooctanoic Acid (**PFOA**)
- b { Perfluorinated Carboxylic Acids (**PFCA**s)  
 $C_nF_{(2n+1)}CO_2H$   
With Great Hydrophobic character
- c { Fluorosurfactant fluorinated substances
- d { Perfluorinated Alkylated substances **PFAS**s



Per- and polyfluoroalkyl substances (PFASs) are recalcitrant compounds that through bioaccumulation can cause a several number of **Adverse Health Issues** upon various exposure pathways. PFASs causes endocrine disruptions and are potential carcinogens which will lead to birth defects and obesity. These complications have led the Environment Protection Agency (EPA) to establish health advisory levels of 70 parts per trillion (ppt). PFAS are man made chemicals that are found highly toxic chemicals and used in firefighting foam, non-stick cookware and water-repellent clothing lurking in their water supply. When **PFAS** contaminates the **drinking water source**, is it enough to just treat water that people drink? Or do all countries and communities need to do more to avoid and limit resident's exposure?

"The real fact is that, these compounds are so persistent that if they are in the water in any case, whatever the water is used for has the potential to cause an exposure issue. We all know if we feed this water to dairy farms, fish farms then the milk, fishes and all the products are contaminated too. Even were the soil being contaminated food is contaminated too.

**Watch Water**<sup>®</sup> has a solution to treat PFAS – contaminated water with **Catalytic Carbon MG** and regenerate and deadsorbs the carbon with **SuperOxy (SO)**. These **SuperOxy** system uses **Titanium dioxide Powder** mixed with **Oxydes-P**. This process breaks down the contaminant's formidable molecular bonds while cleaning the waste water and systematically destroying the hazardous compounds with **Solar or UV energy**. "**SuperOxy (SO)** oxidation is a simple, clean and most effective method for destruction of **PFAS and other co-contaminants** as a complementary procedure to other waste water treatment processes." We can break down and eliminate these contaminants from Ground Water, Surface Water, Waste Water and Soil. These **SuperOxy** process systematically breaks down PFAS and transforming it from a toxic, hazardous material to a) **Carbon dioxide** b) **Water** c) **fluoride**.

As **Watch Water**<sup>®</sup> is a leader in Oxidation technology, the **Titansorb P** (Titanium dioxide Powder) powders are providing themselves as key workhorses in the regeneration of adsorber process. **Catalytic Carbon MG** is showing great results even after plenty of regenerations.