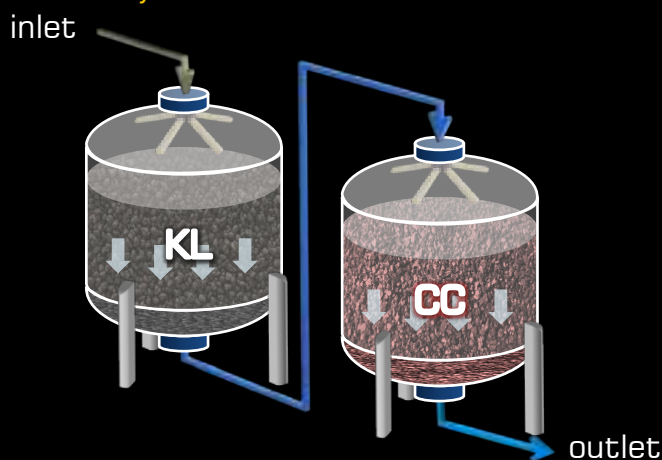


Polishing

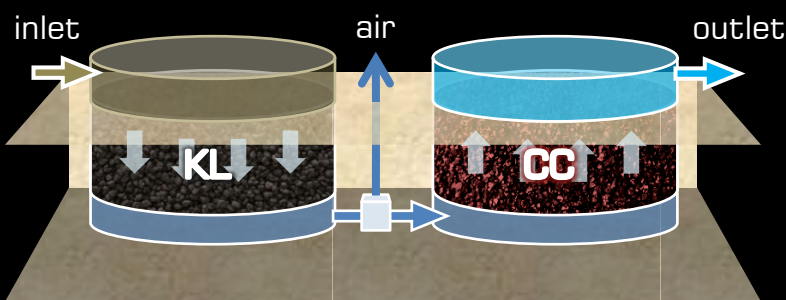
waste water with

CATALYTIC - CARBON

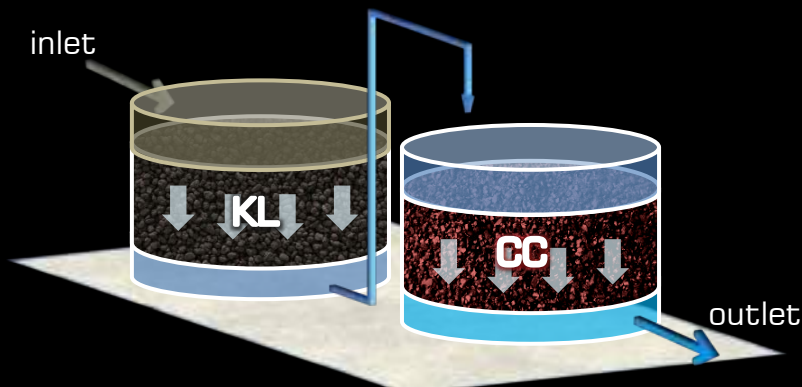
System I (Pressure Vessels)



System II (Underground Pit)



System III (Above ground Clarifier)



Polishing Systems

Watch Water® has developed a unique Catalytic Carbon and related systems for polishing a waste water stream to remove all toxic contaminants. The first system (**System I**) includes a pressure vessel containing **Katalox-Light** filtration media to remove selected contaminants from the waste water stream. In another pressure vessel, the vessel contains a bed of Catalytic Carbon. Both the systems are based on single bed down flow technology. This technology is also suitable for in-ground pit (**System II**) as well as above ground tank (**System III**) or combination. The waste water contaminants can include aluminium, chlorine, atrazine and all possible bio-accumulative organics and in the polishing process the presence of arsenic, cyanide, chromium, pathogens and selenium; as in the second process the activated carbon is the media with Metal Hydroxide coating and iron fillings. Presence of fluorides, lead and copper including phosphates and nitrates are also not a problem. All the waste waters can be discharged as to legally allowed limits. Catalytic Carbon technology has solved the problem of trace toxic contaminants prior to discharge.

Water/Wastewater Purification

Contaminated Freshwater

The existing water treatment systems, distribution systems, and disposable habits coupled with huge centralized schemes are no more sustainable. None of the existing technologies and systems can guarantee the availability of water for all users in accordance with stringent water quality standards. Several activated carbons and filtration technologies are employed on daily basis but **Catalytic Carbon** and **Katalox-Light** has proven to be one of the most advanced ways for water as well as waste water treatment. Developments in Watch Water® research centre have made it possible to invent Catalytic Carbon the most environmentally friendly treatment technology for effectively treating Water/waste water meeting the ever increasing demand for high quality water. Advanced Catalytic technology products use materials which are certified to NSF/ANSI-60 by WQA. The examples of Activated Carbon used in this formation include, for example coconut shell carbon like CX and coated with iron ferrite particles. CC have resulted in all desired outputs of improved polishing permeability, inactivation of bacteria and biological contaminants.

Biological Contaminants

Biological contaminants classified by Watch Water® has three categories, namely

- Microorganisms
- Natural organic matter (NOM)
- Biological toxins

Catalytic Carbon have proved to be very effective in removing bacterial pathogens. Catalytic Carbon possess antimicrobial characteristics against a wide range of microorganisms including bacteria such as E.coli, salmonella and viruses.

The adsorption of cyanobacterial toxins on Catalytic Carbon is much higher when compared with any other carbon based Adsorbent, mainly due to bifunctional ferrous oxide (Fe_3O_4) and specific surface area, external diameter of Catalytic Carbon, large composition of Mesoporous volume and depth filtration and extremely high adsorption rate of bacteria. The

mechanisms of killing biological contaminants by Catalytic Carbon are also due to the production of very high oxidative stress, disturbances to cell membrane. Contamination from bacteria, protozoans and viruses is possible in both ground and surface water and specially in waste water. Ferrous oxide (Fe_3O_4) coating is the most promising material with antimicrobial properties. The efficacy of metal ions in water disinfection is the most promising for water disinfection.

Removal of Heavy Metals and Ions

Different types of technologies have been introduced for removal of heavy metals from water/waste water such as Ion-exchange Resins, Membranes and NF membranes. These technologies have never been successful because of very high costs and 30 to 40% waste as discharge into aquatic environment which has badly affected all living organisms. Every traditional treatment technologies like activated carbon, Ion-exchange Resins, nano-filtration (NF), and reverse osmosis (RO) membranes are not effective to treat complex and complicated polluted waters comprising

- Pharmaceuticals
- Personal care products
- Surfactants
- Industrial additives
- Toxic chemicals
- Pathogenic microorganisms

Cost:

Concentrate rejection of Ion-exchange Resins and Membrane technologies all around the world are the major cause of multiple problems of contamination of ground, surface and municipal water. Antiscalants based on Phosphates, Phosphonates are causing Algal blooms and Eutrophication.

This is the right time to address Water problems since Ion-exchange and membranes will destroy the complete water cycle.

Adsorption & Absorption of Heavy metals

TITANSORB



Watch Water® has proved that metal based materials than other technologies, for example, adsorption of Arsenic by using Titansorb based on TiO_2 nanoparticles. Titansorb is a German Government Patent owned now by Watch Water® Germany. Titansorb (TiO_2) in removing different forms of Arsenic has shown the highest capacity than any other commercially available TiO_2 based Adsorbents. Titansorb has the highest removal efficiency of arsenic at about 6.9 pH value. [See Titansorb Brochure](#)

FERROLOX



Watch Water® adsorbent based on Iron Hydroxide has very high surface and surface charge, and has very high capacity on removal of Arsenic, Humic Acid (HA) and phosphates including copper, chromium, and many other free metals and organic matter concentrations in water through adsorption reactions. Some companies have developed techniques for coating iron oxide on to sand surface in order to overcome the difficulties of making Adsorbent such as Ferrolox, but Iron Oxide coated on sand has the lowest surface charge and adsorption capacity. Ferrolox is the best choice to remove Hydrogen Sulfides from water and wastewater.

Humic Acid Removal

All previous studies have proved that the high content of tannins, humic acid (HA) concentration in drinking water has the potential for many serious diseases, such as brain damage and stomach cancer. Humic substances form Trihalomethanes (THM's) and other halogenated organic compounds during chlorination of water supplies. In addition, the capability of HA complication with heavy metals can increase the migration of heavy metal ions in water, which is the most important issue in WATER TREATMENT.

Iron-coated activated carbon (Catalytic Carbon) has the highest capacity to adsorb humic acid (HA).



Capacity

Activated Carbon without coating = 40mg/g
Catalytic Carbon = 80mg/g

The maximum Adsorption capacity of Catalytic Carbon is at pH 6.5-7.0 at 30° C temperature. The efficiency of Catalytic Carbon will decrease with increasing pH. Catalytic Carbon will remove all Arsenic from water. Latest studies have reported that intake of Humic Acid with Arsenic is the cause of the etiological factors for Blackfoot disease. Therefore, the polishing of water or bottle water in drinking water and any other process of water in food industry is of significant importance and interest.

Catalytic Carbon - a real Polisher

Traditional Systems

All traditional activated carbons can be reasonably used in order to remove all trace heavy metals, organics and humic acid from water. All activate carbons can only be used in water treatment systems to remove odor, taste and color problems in drinking water. Traditional activated carbons can only remove chlorine but not related Disinfection by-Prodctcs (DBPs) like Chloramines and Trihalomethanes including Halogenated organic compounds. In addition, half of the adsorption capacity compared to Catalytic Carbon.

The conventional drinking water treatment process of coagulation, sedimentation and sand or Anthracite filtration remove between 10% to 30% of dissolved heavy metals and humic substances. Ion exchange resins, evaporation, reverse osmosis and chemical precipitation - all these technologies suffer from huge drawbacks like high capital costs, energy costs and operational cost and non of these manufactures have answer to disposal of concentrates. Therefore, it is important to use Catalytic Carbon which is an innovative technique to polish drinking water quality from heavy metals, organic matters and DBP's contamination.

Highest active Surface Carbon

As described in our brochure that Catalytic Carbon has a higher surface area than all powder activated carbon (PAC) and the granules activated carbons available in the market. Standard activated carbon's are all steam activated, and thus have the lowest adsorption

capacity, active surface area and low performance. Note that Catalytic Carbon is alkali-activated and have increased Active surface area. The Catalytic Carbon manufactured by Watch Water® is excellent in adsorption performance and polishing performance and thus preferable as the best activated carbon available in the market.

Regeneration Oxidation

The Alkali-Catalytic Carbon is 100% invention of Watch Water® which has the highest surface as well as increased active surface area and a high adsorption performance of polar substances. It is preferably used as an adsorbent for water polishing of decomposing and removing residential chlorine, adsorbing and removing organic chlorine compounds such as Trihalomethane, Pharmaceutical waste, solvents and with its real metal hydroxide double layer capacitator it is also applicable for an oxidation treatment, for example, chemical oxidation and regeneration with inorganic oxidizing acid from Watch Water®. The concentration of the Inorganic acid with oxidation in the washing solution containing an **OXYDES-P** is preferably about 5%. After injection or suction the mixture at a temperature of 20°C to 50°C for 10 to 30 minutes is preferred. After rinsing the Catalytic Carbon for 5 to 10 minutes the performance is again 100% for further polishing and adsorption.

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