



ZEOLITE For WATER FILTRATION

Markets:

Swimming Pool Filter Medium, Waste Water/Sewerage Treatment, Heavy Metal Removal, Water Filters, Water Prefilter; Agricultural, Horticultural and Industrial Dam Water flocculation

Natural Zeolite can be used to filter and purify swimming pools, town water supplies, sewerage effluent, biological wetlands, industrial and mining waste-water and aquaculture ponds.

Water filtration, apart from the removal of solids and colloids, increasingly demands the efficient removal contaminants including heavy metals and other toxic substances, bacteria and other parasites. Conventional sand filter systems do not remove all contaminants and therefore alternative or additional systems are required so that the water quality meets compliance regulations.

The filtering abilities of Zeolites offer a versatile and environmentally friendly option to capture most contaminants found in water systems. Natural Zeolites can perform these functions due to their high ion exchange capacity, adsorption-desorption energies and ability for modification. Zeolites have an open, regular crystalline framework that generates an electric field that interacts, attracts and binds various cations and, after modification, anions.

Zeolites have a particularly high selectivity for ammonium (NH_4^+) and can reduce the ammonium content in waste-water by up to 97%. NH_4^+ has serious environmental consequences because of its toxicity to aquatic life, contribution to algal eutrophication, reduction in dissolved oxygen and detrimental effects on disinfection of water.

Modifications such as charge change from (-) to (+) provides Zeolite with the flexibility to absorb anions as well as cations and also some non-polar organics such as benzene, toluene and xylene.

Zeolites can be charged with 'antibiotic' cations of Ag, Cu, Zn to provide antimicrobial properties. Zeolite filterbeds can remove contaminants to purify air (Ammonia NH_3 , H_2S , CO_2 , CO, SO_2).

The hard, durable nature of Zeolites enables them to perform a range of filter functions to produce improved water quality more efficiently than both the conventional slow or rapid sand filter systems. robust, insoluble Zeolites have improved attrition qualities and are adaptable to re-use through regeneration and recycling.

Benefits of Zeolite/Silica Sand Beds Over Traditional Silica Sand Systems Conventional Slow Sand Filter Systems (Andrews, 1993)

The top 20cm of a 1 metre thick bed of finely graded silica sand (0.5mm to 0.6mm) was replaced with Zeolite. The Benefits Are:

- ✓ Higher throughput rate up to $0.75\text{m}^3/\text{hr}/\text{m}^2$ versus $0.15\text{m}^3/\text{hr}/\text{m}^2$, while still maintaining water quality (measured in turbidity).
- ✓ Longer runs, up to 50%, even at higher loadings.
- ✓ Up to 3 to 5 times more water processed between maintenance scrapings.
- ✓ Curing time is less, due to the rapid development of the schmutzdecke or biofilm.

Conventional Rapid Sand Filtration

Burtica et al., 1997 found:

- ✓ The optimum height of the Zeolite filtering layer is 35% of the height of quartz sand.
- ✓ The effluent obtained with Zeolite was better than the results obtained with sand filters.
- ✓ Zeolite reduced turbidity and, organic charge (2nd filtering cycle) by 30% as opposed to 10% with sand.

Sewerage/Waste-water Treatment

Zeolite significantly improves the plant capacity, process efficiency and effluent discharge quality from activated sludge sewerage treatment plants. It is also markedly improves nitrification and reduces odours to negligible levels. The Zeolite particles act as seeds to boost bacterial flocs by attracting and increasing bacterial action per unit volume.

Filtration Removal of Heavy Metals

Zeolites are low cost ion-exchangers for the removal and recovery of heavy metals cations (Pb, Cu, Cd, Zn, Co, Cr, Mn and Fe; Pb, Cu as high as 97%) from drinking and waste-waters.

Zeolite rotary hoed (to a depth of 30cm – 40cm; 6.67 mg Zeolite/kg spoil) into a tailings dump with high levels of Cu and Zn sulphide contamination reduced Cu and Zn levels in waste-water discharge by 95% and 92% respectively.

Liners

Zeolites can be used in lining seals around town garbage landfills, tailings dump/dams and low-level radioactive waste repositories to prevent groundwater contamination.

Food Industry

Filter aid for purifying and clarifying (e.g. wine or sugar solutions).