ZEOMANGAN

Zeomangan, used for removing soluble iron and / or manganese as well as hydrogen sulfide from well water supplies, is a purple-black filter media processed from ceramic zeolite granule. Zeomangan can be used in a completely closed pressure system with no aeration or repumping, or in an open gravity filter system.

The most common methods of operation are continuous regeneration, which is recommended for predominantly iron water.

PHYSICAL CHARACTERISTICS

Apparent density----------1.0 g / ml
Shipping weight----------30 Kg / 30L
Specific gravity----------2.5 ~ 2.6
Screen grading (dry)----------16 ~ 30 mesh
Effective size----------0.65 ± 0.05 mm
Uniformity coefficient----------Less than 1.5
pH range----------6.2 ~ 8.5
Maximum temperature----------25℃
Maximum pressure drop----------0.85 kg / cm^2
Backwash rate----------40 ~ 50 m / hr
Service flow rate----------5 ~ 12 m / hr
Minimum bed depth----------70 cm

METHODS OF OPERATION

*** Continuous regeneration**

Continuous regeneration operation is recommended for well water where iron removal is the main objective with or without the presence of manganese. Briefly, it involves the feeding of predetermined amount of potassium permanganate ($KMnO_4$), usually in combination with chlorine (Cl_2), directly to the raw water prior to the unit containing Zeomangan continuous regeneration. The chlorine should be fed upstream of the $KMnO_4$ with a contact time of 10 ~ 20 seconds if possible. Sufficient chlorine should be fed to produce the desired residual in the filter effluent. Enough $KMnO_4$ should be fed to produce a “just pink” color in the filter inlet. This will maintain the Zeomangan media in a continuously regenerated condition.

The quantity of Cl_2 and $KMnO_4$ required can be estimated as follows：

$$mg/L\ Cl_2 = mg/L\ Fe$$

$$mg/L\ KMnO_4 = (0.2 \times mg/L\ Fe) + (2 \times mg/L\ Mn)$$

Without Cl_2 the $KMnO_4$ demand can be estimated as follows：

$$mg/L\ KMnO_4 = (1 \times mg/L\ Fe) + (2 \times mg/L\ Mn)$$

Suggested operating conditions

* **Backwash**---Sufficient rate using treated water to produce approximately 30% bed expansion.
* **Rinse**---------At normal service flow rate for 5 minutes or until effluent is acceptable.
* **Capacity**-----350 ~ 500 g/m^2 of bed area based on potassium permanganate demand. In addition to the Zeomangan continuous regeneration a 70 cm minimum bed of specially sized Zeomangan is required. In any case the pressure drop should not exceed 0.70 ~ 0.85 kg/cm^2.
* **Flow rate**----Normal flow rates with continuous regeneration operation are 5 ~ 12 m/hr. Higher concentrations of iron and manganese usually require lower flow rates for equivalent run lengths. Rates in excess of 12 m/hr can usually be tolerated but a pilot unit should be operated to determine the effluent quality and run length.

The run length between backwashes can be estimated as follows :

Example : What is run length on a water containing 1.7 mg/L iron and 0.3 mg/L manganese at 10m/hr operating rate ?

$$KMnO_4\ demand = (1 \times mg/L\ Fe) + (2 \times mg/L\ Mn)$$

$$= (1 \times 1.7) + (2 \times 0.3)$$

$$= 2.3\ mg/L$$

At 500 g/m^2 loading ÷ 2.3 mg/L = 217 m

At 10 m/hr service rate, 217/10 = 21.7 hr

* Therefore the backwash frequency is approximately every 20 ~ 24 hours of operation.

GENERAL NOTES

Raw waters having a pH of 6.2 or higher can be passed through Zeomangan without pH correction; water having a pH lower than 6.2 should be pH corrected to 6.2 ~ 6.5 before passing through the Zeomangan. If a pH higher than 6.5 is desired in the water system, the additional alkali should be added after the filters due to the adverse reaction（formation of a colloid）that sometimes occurs with the iron and alkali with pH over 6.5.

$KMnO_4$ solution strength — With continuous regeneration operation the $KMnO_4$ can be any concentration up to 30 g/L .

Solubility of $KMnO_4$ in water	
Temp. ℃	g/100 ml
0	2.78
20	6.51
40	12.53