THERMAX

TULSION® A-2X MP

MACROPOROUS WEAK BASE
ANION EXCHANGE RESIN

TULSION® A-2X MP is an extremely durable macroporous weak base anion exchange resin characterised by tertiary amine groups attached to a styrene divinylbenzene copolymer matrix. It has a unique physical structure which gives it superior kinetics and greater resistance to osmotic shock than gel type weak base anion exchangers.

TULSION® A-2X MP yields exceptionally high operating capacity on caustic soda regeneration and has low rinse requirements. It has a higher resistance to organic matter than gel type anion exchangers. TULSION® A-2X MP is supplied as spherical moist beads in the free base form, ready to use.

TYPICAL CHARACTERISTICS

Type	:	Macroporous Weak Base Anion Exchange Resin
Matrix structure	:	Polystyrene Copolymer
Functional group	:	Tertiary amine
Physical form	:	Moist Spherical Beads
Ionic form	:	Free base
Screen size U.S.S. (wet)	:	16 to 50
Particle size	:	0.3 to 1.2 mm
Total Exchange Capacity	:	1.5 meq/ml
Swelling (approx.)	:	Free base to Cl^- 20%
Moisture content (approx.)	:	47 %
pH stability	:	0 to 14
Solubility	:	Insoluble in all common solvents
Backwash settled density	:	640 to 680 g/l
Shipping Weight	:	0.66 kg / lit

APPLICATIONS

TULSION® A-2X MP is intended for use wherever an application of weak base exchanger is called for. Its macroporous structure makes it especially suited for application involving aggressive water supplies.
TULSION® A-2X MP will remove free mineral acid ions like chloride, sulfate, nitrate, etc. but will not remove weak acid ions like silica and carbon dioxide. In a deminerlization system, TULSION® A-2X MP can be placed preceding a strong base anion exchanger. This system offers a more economical regeneration cost, as TULSION® A-2X MP operates at a very high regeneration efficiency in comparison to strong base exchangers.

Additional savings can be achieved by regenerating the weak base and strong base exchangers in series. The design must, however, take care to prevent silica precipitation on the weak base exchanger.
TULSION® A-2X MP placed preceding a strong base anion exchanger also serves to protect it from organic fouling.

HYDRAULICS

Pressure Drop

The pressure drop of a fluid passing through an ion exchange column is related to the flow rate, viscosity and temperature of fluid.
The typical Values of the pressure drop across TULSION A-2X MP and the temperature correction factor are given in Figure 1.

Backwash

The backwash step removes the matter filtered out by the exchanger during service and also regrades the bed eliminating any channels which may have formed.

Normally a backwash rate that expands the bed 50 to 70 percent for 5 to 10 minutes or till the effluent is clear, is recommended. The backwash flow rate should always be achieved gradually to prevent loss of resin through surge carry over. Figure 2 shows the relationship between the percentage of bed expansion and backwash flow rate.

REGENERATION

TULSION® A-2X MP is normally regenerated with caustic soda. Soda ash or ammonia can also be used as regenerants. For caustic soda, the optimum regeneration level is 120% of the capacity realized in the exhaustion cycle.

Thoroughfare regeneration of strong base and weak base anion resins offers excellent regeneration economy. The regeneration effciency of TULSION® A-2X MP is enhanced in CO_2 rich water. Hence it is recommended that TULSION® A-2X MP be placed preceding the degasser.

Rinse

This operation is performed to remove the excess of regenerant from the exchanger bed after regeneration. The first portion of the rinse water displaces the regenerant solution, completing the cycle of regeneration. Therefore, it is necessary that the rinse flow rate should be equal to that of regeneration flow rate initially. Afterwards the rate can be increased to flush out the products of regeneration and the excess regenerant as well.

NOTE :
All anion exchangers are prone to iron fouling and oxidative-attack. Therefore, alkali used for regeneration should have low iron and chlorate content. Good quality regenerant such as rayon grade caustic soda should be used as a regenerant.

OPERATING CAPACITY

The operating capacity of TULSION® A-2X MP when used in two-stage demineraliztion system, is dependent upon the following factors :

- exhaustion period
- sulfate content of the influent water
- concentration of free mineral acidity

Figure 3 shows the operating capacity of TULSION® A-2X MP for various periods of exhaustion for 250 ppm sulfates.

Figure 4 shows capacity correction due to different ratios of sulfate & chloride present in water.

Figure 5 shows the effect of FMA on exchange capacity.

Figure 6 shows capacity correction factor on operating capacity, due to the different CO_2 content in inlet water.

In all the cases, the regenerant used is caustic soda and the quantity of regenerant employed is 120% of the capacity realized in the exhaustion cycle. Regeneration at 110% can be used when the inlet water does not contain any organics.

Capacity data is based on a chloride end point of 5 ppm for chloride-containing water and a conductivity end point of 50 μs/cm^2 in the case of pure sulfate water.

TYPICAL OPERATING CONDITIONS

Maximum operating temp	:	175^0 F (80^0 C)
Resin bed depth (minimum)	:	24" (600 mm)
Maximum service flow	:	40 $m^3/hr/m^3$
Backwash expansion space	:	50 to 70%
Backwash expansion flow rate at 77^0F (25^0C)	:	4 to 6 m^3 /hr/m^2
Regenerant	:	NaOH, Na_2CO_3, NH_4OH
Regeneration level	:	120% of operating capacity for NaOH
Regeneration concentration	:	1 to 5 %
Regeneration time	:	20 to 60 minutes
Rinse flow rate : Slow	:	At regeneration flow rate
Fast	:	At service flow rate
Rinse volume	:	2 to 7 m^3/m^3

Influent Limitations

Free chlorine	:	Not traceable
Turbidity	:	Less than 2 N. T. U.
Iron and heavy metals	:	Less than 0.1 ppm.

Example :

Inlet Water Analysis

HCO_3	=	6 ppm as $CaCO_3$	FMA	=	50 ppm as $CaCO_3$
Cl^-	=	25 ppm as $CaCO_3$	% SO_4^{2-} / EMA	=	50
SO_4^{2-}	=	25 ppm as $CaCO_3$	CO_2	=	6 ppm as $CaCO_3$

CASE I : Flowrate = 100 m^3 /hr Service hrs. = 8 hrs

Operating Capacity = 56.67 g $CaCO_3$/l (From fig. 3)

Capacity correction due to 50 % SO_4 /EMA ratio = 0.9375 (From fig. 4)

Capacity correction due to 50 ppm FMA = 0.8 (From fig. 5)

CO_2 correction factor due to 6 ppm CO_2 = 1.0 (From fig. 6)

Corrected Cap = 56.67 X 0.9375 X 0.8 X 1.0 g $CaCO_3$/l = 42.50 g $CaCO_3$/l

CASE II : Flow rate = 100 m^3/hr. Service hrs. = 20 hrs.

Operating Capacity = 63.63 g $CaCO_3$/l - (From fig. 3)

Capacity correction due to 50 % SO_4 /EMA ratio = 0.9375 (From fig. 4)

Capacity correction due to 50 ppm FMA = 0.8 (from fig. 5)

CO_2 correction factor due to 6 ppm CO_2 = 1.0 (From fig. 6)

Corrected Capacity = 63.63 X 0.9375 X 0.80 X 1.0 g $CaCO_3$/l = 47.72 g $CaCO_3$/l

HANDLING, STORAGE & SAFETY

The resin must never be allowed to dry. Store the drum in shade. Regularly open plastic bags and check the condition of the resin when in storage. If not moist, add enough soft or DM water.
The floor must be cleaned immediately in case of spillage to avoid slipping due to spherical beads.

PACKING :

Super sacks	1000 lits
MS drums	180 lits
HDPE lined bags	25/30 lits

Super sacks	35 cft
Fibre drums	7 cft
HDPE lined bags	1 cft

For Handling, Safety and Storage requirements, please refer to the individual Material Safety Data Sheets available at our offices.