



Fluoride Removal Using Tulsion® TFR-93

Objective

Fluorides are found in the waste discharges from process streams in a number of industries. Significant amounts of fluoride come from the following industries: semiconductor, photovoltaic, glass manufacturers, electroplating, steel & aluminium, pesticides and fertilizers. The fluoride concentration in untreated effluent can vary over a large range, and the allowable level for discharge depends on the place of disposal. When there is any risk of fluoride seeping back to water supplies, a limitation of around one ppm fluoride is typical. Apart from treatment of industrial waste streams, the other main application of fluoride removal is the treatment of potable water supplies to reduce the fluoride content to 1 ppm or less.

Diseases Caused By Fluoride In Potable Water

Fluoride may damage the brain. Fluoride may cause non-IQ neurotoxic effects. Fluoride affects the pineal gland.

Fluoride causes arthritic symptoms. Fluoride damages bone, it may increase hip fractures in the elderly. Fluoride may cause bone cancer (osteosarcoma).

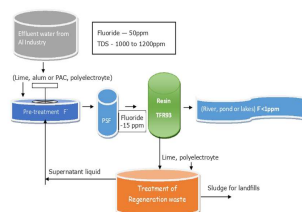
Fluoride affects thyroid function.

People with impaired kidney function are particularly vulnerable to bone damage.

Approach

One of our customers, which is world's largest aluminium rolling company was facing issue with its waste water. The problem identified was the amount of fluoride in waste water. Tulsion® TFR-93 was selected against our standard product Tulsion® CH-57 considering the higher level of fluorides and TDS in effluent water. Tulsion® TFR-93 is a fluoride selective resin and more suitable for water with high TDS. It can bring down the fluorides level to 0.5-1 ppm as per the PCB norms for fluoride in effluent discharge.

Typical Treatment Scheme



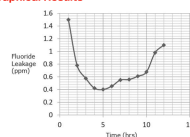
Study Details

Particulars	Unit	Values
Resin		Tulsion® TFR-93
Resin volume	ml	450
Bed height	mm	1000
Regenerant		Aluminium sulphate
Regenerant concentration	%	10
Regeneration level (100%)	g/l	160
Service flow rate	BW/hr	5-12
Regeneration time	min	40 to 45
Slow rinse	BV	2
Fast rinse	BV	1
Bed contact time	min	5-20
End point	ppm	1.0

Effluent Characteristics

Particulars	Unit	Values
Parameters	Before pre-treatment	After pre-treatment
pH	6.58	7.7
Conductivity (µs/cm)	1650	1780
F- (ppm)	30.1	15.2
Chemicals used for pre-treatment(ppm)		Lime—300
		Alum—300
		FeCl3—50
		Poly—1

Graphical Results



Results Achieved

Parameter	Unit	Tulsion® TFR-93
Inlet fluorides	mg/l	15.2
Operating capacity	Eq/lt	0.145
Treated Bed volume	BV	190
Total service hours	Hrs	21
Average fluoride leakage	ppm	0.6 - 0.7
Average pH of cycle		5.5 - 6

Suggested Influent Parameters Of Tulsion® TFR-93

- pH of influent should be 5.5 to 7.5.
- Phosphate ion should be less than 5 ppm.
- Ferric ion (Fe3+) should be less than 3 ppm.

Industrial Applications

- Semiconductor
- Photovoltaic
- Glass manufacturers
- Electroplating
- Steel and aluminium
- Pesticides and fertilizer



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