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DOWEX Ion Exchange Resins

The Removal of Oxygen and Chlorine from Water

The Removal of Oxygen

Dissolved oxygen can be reduced by using sodium sulfite according to following reaction:

$2\ Na_2SO_3 + O_2 \rightarrow 2Na_2SO_4$

Based on this equation, a minimum of 7.87 mg Na_2SO_3 is necessary per mg dissolved O_2. The table shows levels required to remove different amounts of dissolved oxygen:

Dissolved Oxygen		Sodium Sulfite (theoretical amount)	
cc/liter**	mg/l	mg/l	lbs/ 1000 gal.
0.1	0.14	1.1	0.0094
0.2	0.29	2.3	0.019
0.3	0.43	3.4	0.028
0.4	0.57	4.5	0.038
0.5	0.72	5.6	0.047
1.0	1.4	11.3	0.094
2.0	2.9	22.5	0.19
5.0	7.2	56.3	0.47
10.0	14.3	112.5	0.94

**1 cc dissolved oxygen per liter = 1.43 mg/l
1 mg/l dissolved oxygen = 0.698 cc/liter

The Removal of Chlorine

Chlorine is a strong oxidant and may readily degrade ion exchange resins. Chlorine levels in water can be reduced using sulphur dioxide or sodium sulphite according to following reactions:

$Na_2SO_3 + Cl_2 + H_2O \rightarrow 2HCl + Na_2SO_4$

$SO_2 + Cl_2 + H_2O \rightarrow 2HCl + H_2SO_4$

Per gram of chlorine to remove, one needs to add a minimum of 0.91 gram of SO_2 or 1.78 gram of Na_2SO_3. This leads to following amounts of reducing agents to add per 1000 liter of water for the given chlorine levels:

Cl_2	Na_2SO_3 (theoretical amount)		SO_2 (theoretical amount)	
mg/l	g/1000 l	lbs/1000 gal.	g/1000 l	lbs/ 1000 gal.
0.1	0.18	0.0015	0.09	0.00075
0.5	0.89	0.0075	0.45	0.0038
1	1.78	0.015	0.91	0.0075
2	3.56	0.030	1.82	0.015
3	5.34	0.045	2.73	0.0225
4	7.12	0.06	3.64	0.03
5	8.90	0.075	4.55	0.038
10	17.80	0.15	9.10	0.075

WARNING: Oxidizing agents such as nitric acid attack organic ion exchange resins under certain conditions. This could lead to anything from slight resin degradation to a violent exothermic reaction (explosion). Before using strong oxidizing agents, consult sources knowledgeable in handling such materials.

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