SEPARATION TECHNOLOGIES

ION EXCHANGE RESINS

DUOLITE A 102 D

ENGINEERING DATA SHEET (COUNTER CURRENT REGENERATION)

Auchtel

Duolite A 102 D is a type 2 strong base Anion Exchange Resin. These data provide information to calculate the silica leakage and operating capacity of Duolite A 102 D used with counter current regeneration.
The properties of Duolite A 102 D are described in the product Data Sheet.

SILICA LEAKAGE

The average silica leakage is obtained by multiplying the basic leakage value from Table 1 by the correction factors A, B and C from Tables 2 to 4

$$LEAK = LEAK_O \times A \times B \times C$$

TABLE 1 : Basic Silica Leakage versus NaOH regenerant level.

NaOH g / L	Leakage ppm SiO_2 ($Leak_O$)
30	0.050
40	0.036
50	0.024
60	0.017
80	0.010

TABLE 2 : Leakage Correction Factor A versus Silica to Total Anions ratio.

SiO_2 %	Factor A
1	0.2
5	0.5
10	1.0
20	2.0
30	3.0
40	4.0
50	5.0

TABLE 3 : Leakage Correction Factor B versus Water Temperature..

Water ^0C	Factor B
5	0.7
10	0.8
15	1.0
20	1.2
25	1.5
30	2.2

TABLE 4 : Leakage Correction Factor C versus Regenerant Temperature.

Water ^0C	Factor C
10	1.65
15	1.37
20	1.16
25	1.00
30	0.87

TABLE 3 : Suggested Operating Conditions

Maximum operating temperature	35 ^{0}c (OH^-), 70 ^{0}c (Cl^-)
Minimum bed depth	1000 mm **
Service flow rate	5 to 40 BV* / hr
Maximum linear velocity	40 m / hr
Regenerant	NaOH
Level	30 to 100 g / L
Flow rate	2 to 8 BV/ hr (minimumcontact time : 30 minutes)
Concentration	3% to 5% .
Slow rinse	Minimum 2 BV at regeneration flow rate
Fast rinse	Same as service flow rate.

* 1 BV (Bed Volume) = 1 m^3 solution per m^3 resin
** For selection of lower of bed depth please contact Auchtel technical representative

Influent Limitations	
Free chlorine	- Nil
Turbidity	- < 1 NTU
Iron & heavy metal	- < 0.1 ppm

OPERATING CAPACITY

The operating capacity of Duolite A 102 D is obtained by multiplying the basic capacity value from Table 6 by the correction factor D to G from Tables 7 to 10.

$$Cap = Cap_O \times D \times E \times F \times G$$

TABLE 6 : Basic Capacity versus NaOH regenerant level (counter current regeneration)

NaOH g/L	Capacity eq/L (Cap_O)
30	0.65
40	0.82
50	0.92
60	0.98
70	1.04
80	1.06
100	1.08

TABLE 7 : Capacity Correction Factor D versus Sulphate to Total Anions Ratio.

SO_4 %	Factor D
0	0.94
25	0.97
50	1.00
75	1.03
99	1.06

TABLE 8 : Capacity Correction Factor E versus Carbon Dioxide to Total Anions Ratio.

CO_2 %	Factor E
0	0.97
20	1.00
30	1.02
50	1.05
75	1.08
99	1.12

TABLE 9 : Capacity Correction Factor F versus Silica to Total Anions Ratio and NaOH Temperature(^{c}C)

	----------- % SiO_2 ------------					
	5	**10**	**20**	**30**	**40**	**50**
5^{0}C	0.96	0.93	0.87	0.83	0.81	0.79
10	0.97	0.94	0.89	0.85	0.82	0.80
15	0.98	0.95	0.91	0.87	0.84	0.81
20	0.99	0.96	0.92	0.89	0.87	0.85
25	1.00	0.98	0.94	0.90	0.88	0.86
30	1.01	0.99	0.95	0.92	0.89	0.86

TABLE 1 0 : Capacity Correction Factor G versus Silica Endpoint (DSiO_2 = difference between average leakage and endpoint)

DSiO_2 (ppb)	Factor G
50	0.90
100	0.95
200	1.00
300	1.04

SAFE USE INFORMATION

A Material Safety Data Sheet is available for each product. To obtain a copy contact your Auchtel representative.

CAUTION

Acid and basic regenerant solutions are corrosive and should be handled in a manner that will prevent eye and skin contact. Nitric acid and other strong oxidizing agents can cause explosive type reactions when mixed with Ion Exchange Resins. Proper design of process equipment to prevent rapid bildup of pressure is necessary if use of an oxidizing agent, such as nitric acid is contemplated. Before using strong oxidizing agents in contact with Ion Exchange Resins, consult sources knowledgeable in the handling of these materials.

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ION EXCHANGE RESINS

DUOLITE A 102 D

ENGINEERING DATA SHEET
(CO-CURRENT REGENERATION)

Auchtel

Duolite A 102 D is a type 2 strong base Anion Exchange Resin. These data provide information to calculate the silica leakage and operating capacity of Duolite A 102 D used with co-current regeneration.
The properties of Duolite A 102 D are described in the product Data Sheet.

SILICA LEAKAGE

The average silica leakage is obtained by multiplying the basic leakage value from Table 1 by the correction factors A, B and C from Tables 2 to 4

$$Leak = Leak_0 \times A \times B \times C$$

TABLE 1 : Basic Silica Leakage versus NaOH regenerant level.

NaOH g / L	Leakage ppm SiO_2 ($Leak_0$)
50	0.120
60	0.081
80	0.039
100	0.028

TABLE 2 : Leakage Correction Factor A versus Silica to Total Anions ratio

SiO_2 %	Factor A
1	0.2
5	1.0
10	2.0
20	4.0
30	6.0
40	8.0
50	10.0

TABLE 3 : Leakage Correction Factor B versus Water Temperature..

Water ^{0}C	Factor B
5	0.7
10	0.8
15	1.0
20	1.2
25	1.5
30	2.2

TABLE 4 : Leakage Correction Factor C versus Regenerant Temperature.

Water ^{0}C	Factor B
10	1.65
15	1.70
20	1.16
25	1.00
30	0.87

TABLE 3 : Suggested Operating Conditions

Maximum operating temperature..........	35 ^{0}c (OH^-), 70 ^{0}c(Cl^-)
Minimum bed depth	700 mm
Service flow rate	5 to 40 BV* / hr
Maximum linear velocity	40 m / hr
Regenerant	NaOH
Level	50 to 100 g / L
Flow rate	2 to 8 BV/ hr(minimumcontact time : 30 minutes)
Concentration	3% to 5% .
Slow rinse	Minimum2 BV at regeneration flow rate
Fast rinse	Same as service flow rate.

* 1 BV (Bed Volume) = 1 m^3 solution pe

Influent Limitations

Free chlorine	- Nil
Turbidity	- < 2 NTU
Iron & heavy metal	- < 0.1 ppm

OPERATING CAPACITY

The operating capacity of Duolite A 102 D is obtained by multiplying the basic capacity value from Table 6 by the correction factor D to G from Tables 7 to 10.

$$Cap = Cap_0 \times D \times E \times F \times G$$

TABLE 6 : Basic Capacity versus NaOH regenerant level (Co- curent regeneration)

NaOH g/L	Capacity eq/L (Cap_0)
50	0.85
60	0.91
70	0.96
80	0.99
100	1.03

TABLE 7 : Capacity Correction Factor D versus Sulphate to Total Anions Ratio.

SO_4 %	Factor D
0	0.94
25	0.97
50	1.00
75	1.03
99	1.06

TABLE 8 : Capacity Correction Factor E versus CO_2 content (% of Total Anions)

CO_2 %	Factor E
0	0.97
20	1.00
30	1.02
50	1.05
75	1.08
99	1.12

TABLE 9 : Capacity Correction Factor F versus Silica to Total Anions Ratio and NaOH Temperature(^{0}C)

	% SiO_2					
	5	10	20	30	40	50
5^0C	0.96	0.93	0.87	0.83	0.81	0.79
10	0.97	0.94	0.89	0.85	0.82	0.80
15	0.98	0.95	0.91	0.87	0.84	0.81
20	0.99	0.96	0.92	0.89	0.87	0.85
25	1.00	0.98	0.94	0.90	0.88	0.86
30	1.01	0.99	0.95	0.92	0.89	0.86

TABLE 10 : Capacity Correction Factor G versus Silica Endpoint (ΔSiO_2 = difference between average leakage and endpoint)

ΔSiO_2 (ppb)	Factor G
50	0.90
100	0.95
200	1.00
300	1.04

SAFE USE INFORMATION

A Material Safety Data Sheet is available for each product. To obtain a copy contact your Auchtel representative.

CAUTION

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