

SEPARATION TECHNOLOGIES

ION EXCHANGE RESINS

DUOLITE A 101 D

ENGINEERING DATA SHEET CO-CURRENT REGENERATION



Duolite A 101 D is a type 1 strong base Anion Exchange Resin. These data provide information to calculate the silica leakage and operating capacity of Duolite A 101 D used with Co-current regeneration. The properties of Duolite A 101 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 & C from Tables 2 to 4. For Silica to Total Anion ratio above 75% refer Table No. 11 Silica leakage will increase approximately by 15% for every 1 ppm Sodium leakage from preceding Cation Unit

$$\text{Leak} = \text{Leak}_0 \times A \times B \times C$$

TABLE 1 : Basic Silica Leakage versus NaOH regenerant level

| NaOH g / L | Leakage ppm SiO ₂ (Leak ₀) |
|------------|---|
| 40 | 0.095 |
| 50 | 0.079 |
| 60 | 0.064 |
| 80 | 0.037 |
| 100 | 0.028 |
| 120 | 0.021 |
| 150 | 0.016 |
| 200 | 0.014 |

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

| SiO ₂ % | Factor A |
|--------------------|----------|
| 1 | 0.1 |
| 5 | 0.5 |
| 10 | 1.0 |
| 25 | 2.5 |
| 50 | 5.0 |
| 75 | 7.5 |

TABLE 3 : Leakage Correction Factor B versus water Temperature

| Water °C | Factor B |
|----------|----------|
| 5 | 0.7 |
| 10 | 0.8 |
| 15 | 1.0 |
| 25 | 1.5 |
| 35 | 2.3 |
| 45 | 3.3 |

TABLE 4 : Leakage Correction Factor C versus Regenerant Temperature

| NaOH °C | Factor C |
|---------|----------|
| 10 | 1.65 |
| 15 | 1.37 |
| 25 | 1.00 |
| 35 | 0.76 |
| 45 | 0.58 |
| 50 | 0.50 |

TABLE 5 : Suggested Operating Conditions

| | |
|-------------------------------------|--|
| Maximum operating temperature _____ | 60°C (OH ⁻), 100°C(Cl ⁻) |
| Minimum bed depth _____ | 700 mm |
| Service flow rate _____ | 5 to 40 BV* / hr |
| Maximum linear velocity _____ | 35 m / hr |
| Regenerant _____ | NaOH |
| Level _____ | 40 to 200 g/L |
| Flow rate _____ | 2 to 10 BV/ hr (minimum contact 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 m³ solution per m³ resin

Influent Limitations

Free chlorine - Nil

OPERATING CAPACITY

The operating capacity of Duolite A 101 D is obtained by multiplying the basic capacity value from Table 6 by the correction factors D to G from Tables 7 to 10.

$$\text{Cap} = \text{Cap}_0 \times \text{D} \times \text{E} \times \text{F} \times \text{G}$$

TABLE 6 : Basic capacity versus NaOH regenerant level (co-current regeneration)

| NaOH g / L | Capacity eq/L (Cap ₀) |
|------------|-----------------------------------|
| 40 | 0.56 |
| 50 | 0.59 |
| 60 | 0.62 |
| 80 | 0.70 |
| 100 | 0.76 |
| 120 | 0.80 |
| 150 | 0.83 |
| 200 | 0.85 |

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

| SO ₄ % | Factor D |
|-------------------|----------|
| 0 | 0.92 |
| 25 | 0.96 |
| 50 | 1.00 |
| 75 | 1.04 |
| 99 | 1.08 |

TABLE 8 : Capacity Correction Factor E versus CO₂ to Total Anions ratio.

| CO ₂ % | Factor E |
|-------------------|----------|
| 0 | 0.97 |
| 20 | 1.00 |
| 30 | 1.02 |
| 50 | 1.05 |
| 75 | 1.08 |

TABLE 9 : Capacity Correction Factor F versus Silica to Total Anions and NaOH Temperature.

| %SiO ₂ | Factor F | | |
|-------------------|----------|-------|-------|
| | 25° c | 35° c | 50° c |
| 5 | 1.0 | 1.02 | 1.05 |
| 25 | 0.92 | 0.96 | 1.00 |
| 50 | 0.84 | 0.87 | 0.98 |
| 75 | 0.76 | 0.81 | 0.91 |

TABLE 10 : Capacity Correction Factor G versus Silica Endpoint (D SiO₂ = difference between average leakage and endpoint)

| D SiO ₂ (ppb) | Factor G |
|----------------------------|----------|
| 50 | 0.90 |
| 100 | 0.95 |
| 200 | 1.00 |
| 300 | 1.04 |

SAFE HANDLING INFORMATION

A material Safety Data Sheet, Material handling & storage sheet are available for Duolite products. To obtain a copy contact 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 buildup 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.

The suggestions and data in this bulletin are based on information we believe to be reliable. They are offered in good faith, but without guarantee, as conditions and methods of use of our products are beyond our control. We recommend that the prospective user determine the suitability of our materials and suggestions before adopting them on a commercial scale. The Company maintains a policy of continuous development and reserve the right to amend any specification without notice. DUOLITE is a trademark of Rohm and Hass Company, Philadelphia, U.S.A. and Auchtel Products Ltd. are users of the same in India.

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