Purolite® S106 Resin

for the Removal of Hexavalent Chromium

Purolite S106 epoxy polyamine chelating weak base anion resin exhibits excellent selectivity and kinetics in the removal of hydrophobic oxyanions from aqueous streams.

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About Purolite

Purolite is a leading manufacturer of ion exchange, catalyst, adsorbent and specialty resins. With global headquarters in the United States, Purolite is the only company that focuses 100% of its resources on the development and production of resin technology.

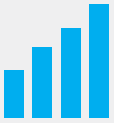
Responding to our customers' needs, Purolite has the widest variety of products and the industry's largest technical sales force. Globally, we have five strategically located research and development centers and eight application laboratories. Our ISO 9001 certified manufacturing facilities in the United States of America, United Kingdom, Romania and China combined with more than 40 sales offices in 30 countries ensure complete worldwide coverage.

PREMIER PRODUCTS

The quality and consistency of our products is fundamental to our performance. Throughout all Purolite plants, production is carefully controlled to ensure that our products meet the most stringent criteria, regardless of where they are produced.

RELIABLE SERVICE

We are technical experts and problem solvers. Reliable and well trained, we understand the urgency required to keep businesses operating smoothly. Purolite employs the largest technical sales team in the industry.



INNOVATIVE SOLUTIONS

Our continued investment in research and development means we are always perfecting and discovering innovative uses for ion exchange resins and adsorbents. We strive to make the impossible possible.

Purolite S106 Resin for the Removal of Hexavalent Chromium

Inside this Engineering Bulletin, you will find an overview of Purolite S106 resin, an epoxy polyamine chelating weak base anion resin that exhibits excellent selectivity and kinetics in the removal of hydrophobic oxyanions from aqueous streams.

Contents

Overview

Purolite S106 is used primarily in potable and groundwater remediation for removing either ppm or ppb levels of hexavalent chromium (Cr^{+6}).

Protonation of the weak base anion exchange sites on the resin is a necessary pretreatment step in its ability to function as an ion exchanger. Reduction of the pH of the influent water to the range of 5.0 to 6.0 is usually adequate to achieve sufficient protonation of the resin for removal of trace levels of oxyanions. The desired range can be accomplished by continuous injection of an acid such as CO_2 upstream of the resin bed. Operation of two ion exchange vessels in a lead-lag configuration can provide greater assurance of meeting the targeted maximum concentration levels in the treated water.

For higher concentrations of oxyanions, it may be necessary to fully protonate the resin by treating with an appropriate quantity of acid. Please contact your local Purolite representative for details.

TABLE 1 Typical Physical and Chemical Characteristics

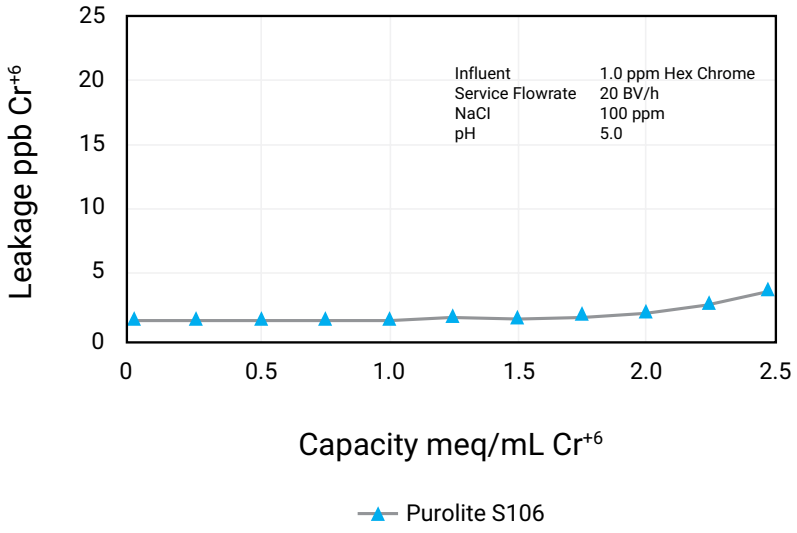
Physical Characteristics	Chemical Characteristics
Polymer Structure	Epoxy
Physical Form	Golden yellow, granular beads
Functional Groups	Polyamine
Ionic Form, As Shipped	Free amine
Total Capacity, Free Base Form	2.0 eq/L (43.7 Kgr/ft³) min.
Moisture Retention, Free Base Form	60–70%
Particle Size Range	300–2,000 µm 2% max. <300 µm
Reversible Swelling, FB → Cl^-	30%
Specific Gravity, Free Base Form	1.05–1.15
Shipping Weight, Cl^- Form	700–800 g/L (43.8–50.0 lb/ft³)

Performance Data

Pilot plant data using a column of Purolite S106 showed a high capacity for hexavalent chromium when treating an influent concentration of 1 ppm hexavalent chromium at an average pH of 5.0. Greater than 99% reduction was achieved when operating at a service flowrate of 20 bed volumes per hour. See Figure 1.

FIGURE 1

Purolite S106 Hexavalent Chromium Removal (Cr^{+6}), Capacity Curve



During this time, approximately 58,000 bed volumes of influent water was treated (see Figure 2), amounting to a loading of approximately 58 g/L of resin or a total of 2.2 equivalents of chrome per liter of resin (eq/L). This is a remarkable feature of the resin. It has the unusual ability to load chromium in excess of its published theoretical capacity of 2.0 eq/L. Further investigation of the phenomenon, including subsequent regeneration of the resin, showed that a significant fraction of the hexavalent chromium loaded on the resin had subsequently converted to the trivalent chromium form. This resulted in precipitated trivalent chrome locked in the matrix of the resin. Similar precipitation has been observed with other hydrophobic resins.

Piloting is recommended, if practical, for all new jobs. More reliable capacity estimates can be obtained and variables such as influent pH control, resin bed depth and specific flowrates (US gal/ ft^3 of resin or BV/h) can be optimized. In general, a lower influent pH will yield a higher capacity. Weak base resins are sensitive to the specific flow rate chosen, with higher flowrates yielding higher leakages. This limitation must be balanced against the need to minimize capital investment and to meet targeted maximum levels of the contaminant in the treated water. Please consult Purolite for recommendations relevant to your specific jobs.

FIGURE 2

Purolite S106 Hexavalent Chromium Removal (Cr^{+6}), Throughput

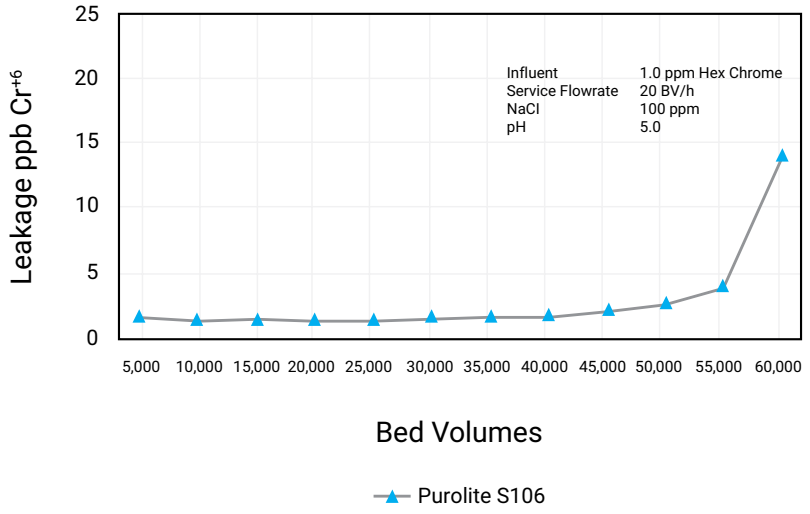


FIGURE 3

Backwash Expansion

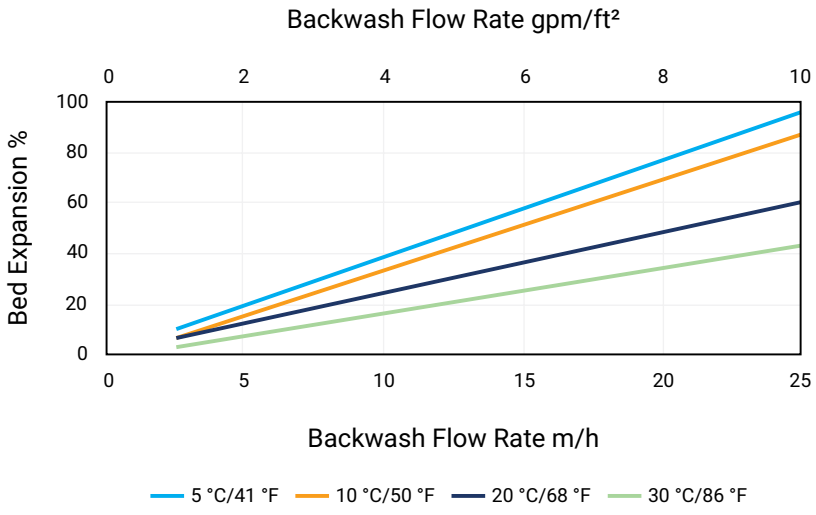
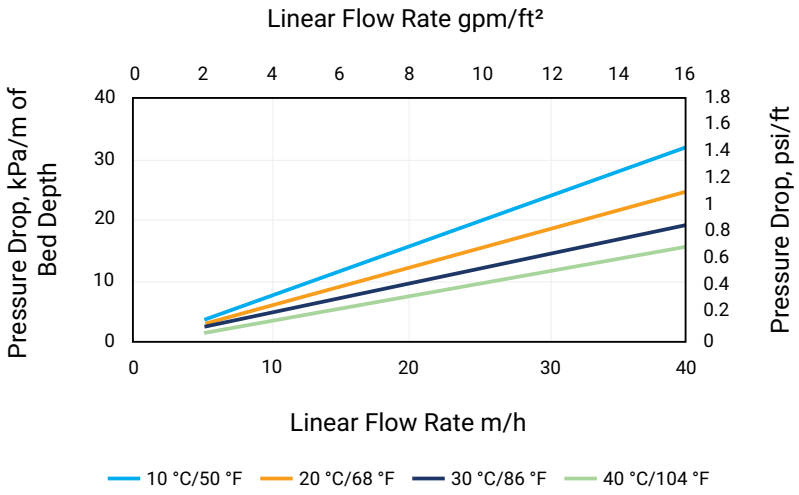


FIGURE 4

Pressure Drop



Safety Information

Strong oxidants, such as nitric acid, may cause violent reactions with ion exchange resins under certain conditions. Use of strong oxidants must be done under the care and supervision of persons knowledgeable in handling these types of materials.

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Purolite, the leading manufacturer of quality ion exchange, catalyst, adsorbent and specialty high-performance resins, is the only company that focuses 100% of its resources on the development and production of resin technology.

We're ready to solve your process challenges. For further information on Purolite products and services, visit www.purolite.com or contact your nearest Technical Sales Office.

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