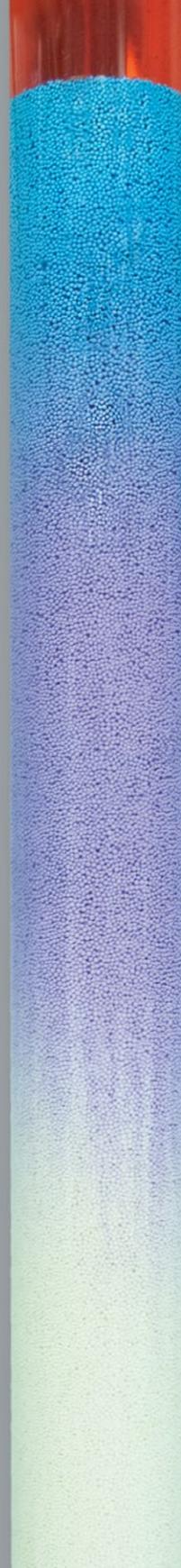


Puromet™ MTS9500: Polystyrenic Macroporous, Aminophosphonic Chelating Resin



Puromet MTS9500 is a macroporous chelating resin for applications including separation and recovery of heavy and transition metals.



Purolite®



Puro-lite®

About Puro-lite

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

Responding to our customers' needs, Puro-lite 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.

Cover image: Puromet MTS9500 being used to separate copper and cobalt from a solution containing 4 g/L cobalt and 200 mg/L copper. A difference in selectivity, due to the special functionality of the resin, causes the two metals to separate into two separate bands, blue copper and pink cobalt. The beige section of resin is as yet un-loaded with any metals.



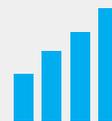
PREMIER PRODUCTS

The quality and consistency of our products is fundamental to our performance. Throughout all Puro-lite 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. Puro-lite 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.

Puromet MTS9500: Polystyrenic Macroporous, Aminophosphonic Chelating Resin

Puromet MTS9500 is a macroporous chelating resin with a polystyrene matrix cross-linked with divinylbenzene and moderately acidic aminophosphonic active groups. This chemical structure facilitates increased selectivity of the resin towards certain polyvalent cations. Puromet MTS9500 is therefore capable of fixing one or more specific cations from a large range even from solutions which have high concentrations of undesirable cations.

TABLE 1 Typical Physical and Chemical Characteristics

Characteristics	Description
Polymer Matrix Structure	Macroporous Styrene-divinylbenzene
Physical Form & Appearance	Beige to pale brown spheres
Functional Groups	$R-CH_2-NH-P(O)(OH)_2$
Ionic Form (As Shipped)	Na^+
Calcium Capacity	26 g/L (minimum)
Moisture Retention, Na^+ Form	57–65%
Particle Size Range	300–1200 μm (1% maximum <300 μm)
Uniformity Coefficient	1.7 (maximum)
Reversible Swelling, $H^+ \rightarrow Ca^+$	20% (maximum)
Reversible Swelling, $H^+ \rightarrow Na^+$	45% (maximum)
Specific Gravity, Moist Na^+ Form	1.13 approximately
Shipping Weight, H^+ Form (Approximate)	710–745 g/L (44.5–46.5 lb/ft ³)
Temperature Limit (Maximum)	80 °C (175 °F)

Applications

Puromet MTS9500 is instrumental in the production of high-purity cobalt and nickel products (metal and salts), such as demanded by the battery industry. In these applications, Puromet MTS9500 is used to remove low concentrations of impurities, such as lead, copper and zinc from concentrated cobalt and nickel liquors.

The operating capacity of Puromet MTS9500 is dependent on the pH and ionic composition of the solution. It has the ability to operate in acidic, neutral or alkaline environments; however, the relative selectivity for metals varies as a function of pH and ionic concentration. It is recommended to conduct laboratory trials to prove specific processes.

For acidic conditions the following list of relative affinities can help to serve as a guide:

$\text{Fe}^{3+} > \text{Bi}^{3+} > \text{Sb}^{3+} > \text{Pb}^{2+} > \text{Fe}^{2+} > \text{Zn}^{2+} > \text{Cu}^{2+} > \text{Mn}^{2+} > \text{Ca}^{2+} > \text{Mg}^{2+} > \text{Ni}^{2+} > \text{Co}^{2+} > \text{Na}^+$

Like other ion exchange resins, Puromet MTS9500 is susceptible to oxidation. Therefore, the direct treatment of solutions containing oxidants should be avoided, as it leads to capacity loss. Free chlorine can be removed from feed solutions by treatment with activated carbon, for example, or chemically reduced by reaction with reducing agents such as sulfur dioxide or sodium sulfite.

Puromet MTS9500 can even be used to polish wastewater of traces of select heavy metals that remain after caustic precipitation.

Typical operating conditions are provided in Table 2. The elution conditions for hydrometallurgical applications are adjusted to suit the specific application and several alternative eluants may be used. Contact your Purolite office for more detail.

TABLE 2 Typical Operating Conditions

Step	Design Basis	Duration
Service	8–30 BV/h (1–4 gpm/ft ³)	
Displacement	Only required for more concentrated feed solutions. Conducted at 4 BV/h (0.5 gpm/ft ³) with soft water.	4–6 BV (1 h–1.5 h)
Backwash	Set for minimum water temperature to give 50% bed expansion. Refer to Figure 1 for details.	1–1.5 BV on clean water supplies and 2–3 BV where solids are present.
Bed Settle	To allow the bed to reform fully classified.	5 to 8 minutes
Acid Injection	Typically, 100–150 g/L hydrochloric acid applied at approximately 4–10% HCl concentration at 2–6 BV/h (0.25–0.75 gpm/ft ³).	Typically, 30–60 minutes, depending on regeneration level and flow rate.
Slow Rinse	2–3 BV (15–22.5 gal/ft ³) at approximate regenerant flow rate with soft water.	Typically, 30–60 minutes, depending on volume of water applied and flow rate.
Sodium Conversion	Typically, 20–80 g/L sodium hydroxide applied at approximately 4% NaOH concentration at 2–4 BV/h (0.25–0.5 gpm/ft ³) Up flow direction in order to fluidize the resin bed and aid the safe expansion to Na form. Alternatively, sodium bicarbonate solution could be used in certain applications. Contact Puro-lite for details.	Typically, 15–60 minutes, depending on volume of water applied and flow rate.
Slow Rinse	2–3 BV (15–22.5 gal/ft ³) at approximate regenerant flow rate with soft water.	Typically, 30–60 minutes, depending on volume of water applied and flow rate.
Fast Rinse	4–6 BV (30–45 gal/ft ³) at approximate service flow rate.	Typically, 10–30 minutes, depending on volume of water applied and flow rate.

The following graphs show the hydraulic data (backwash expansion and pressure drop) of Puromet MTS9500 when used in aqueous solutions for heavy metal removal. For projections of operating capacities, please contact your local Purolite office.

FIGURE 1

Backwash Expansion of Resin Bed

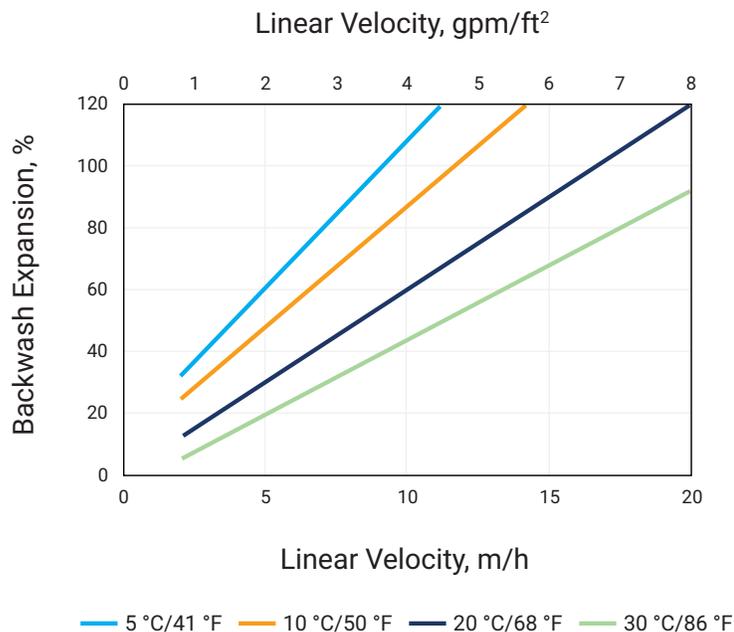
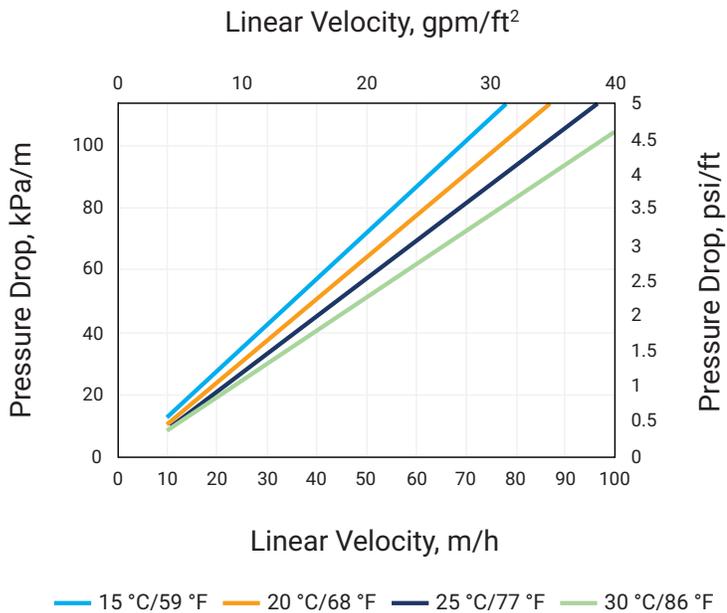


FIGURE 2

Pressure Drop Across Resin Bed





Purolite®

Algeria
Australia
Bahrain
Brazil
Canada
China
Czech Republic
France
Germany

India
Indonesia
Israel
Italy
Japan
Jordan
Kazakhstan
Korea
Malaysia

Mexico
Morocco
New Zealand
Poland
Romania
Russia
Singapore
Slovak Republic
South Africa

Spain
Taiwan
Tunisia
Turkey
UK
Ukraine
USA
Uzbekistan



Americas

Purolite Corporation
2201 Renaissance Blvd.
King of Prussia, PA 19406
T +1 800 343 1500
T +1 610 668 9090
F +1 800 260 1065
americas@purolite.com

EMEA

Purolite Ltd.
Unit D
Llantrisant Business Park
Llantrisant, Wales, UK
CF72 8LF
T +44 1443 229334
F +44 1443 227073
emea@purolite.com

FSU

Purolite Ltd.
Office 6-1
36 Lyusinovskaya Str.
Moscow, Russia
115093
T +7 495 363 5056
F +7 495 564 8121
fsu@purolite.com

Asia Pacific

Purolite China Co. Ltd.
Room 707, C Section
Huanglong Century Plaza
No.3 Hangda Road
Hangzhou, Zhejiang, China 310007
T +86 571 876 31382
F +86 571 876 31385
asiapacific@purolite.com

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.



www.purolite.com

©2021 Purolite Corporation
All rights reserved.
P-000220-NPOLD-0421-ENG-PCO

The statements, technical information and recommendations contained herein are believed to be accurate as of the date hereof. Since the conditions and methods of use of the product and of the information referred to herein are beyond our control, Purolite expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information; NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, IS MADE CONCERNING THE GOODS DESCRIBED OR THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be applicable when such product is used in combination with other materials or in any process. Nothing contained herein constitutes a license to practice under any patent and it should not be construed as an inducement to infringe any patent and the user is advised to take appropriate steps to be sure that any proposed use of the product will not result in patent infringement.