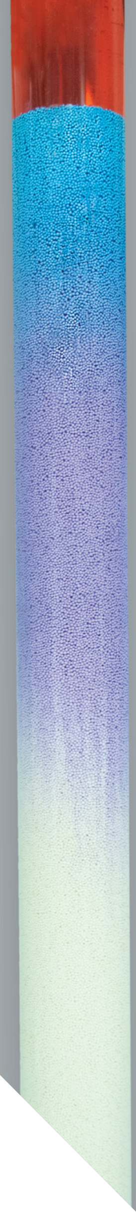

Purolite™ Resins Puromet™ MTS9500: Polystyrenic Macroporous, Aminophosphonic Chelating Resin

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

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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	$R\text{-}CH_2\text{-}NH\text{-}P(O)(OH)_2$
Ionic Form (As Shipped)	Na^+
Calcium Capacity	26 g/L (minimum)
Moisture Retention, Na^+ Form	55–65%
Particle Size Range	300–1200 µm (1% maximum <300 µm)
Uniformity Coefficient	1.7 (max.)
Reversible Swelling, $H^+ \rightarrow Ca^+$	20% (max.)
Reversible Swelling, $H^+ \rightarrow Na^+$	45% (max.)
Specific Gravity, Moist Na^+ Form	1.13 approximately
Shipping Weight, H^+ Form (approx.)	710–745 g/L (44.5–46.5 lb/ft^3)
Temperature Limit (max.)	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.

Moreover, MTS9500 plays a crucial role in preserving liquid amine in post-combustion carbon capture units, removing metal contaminants like iron and thus slowing the degradation of the carbon capture media.

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:

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

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 Ecolab 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.	5–8 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 Ecolab 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 Ecolab office.

FIGURE 1

Backwash Expansion of Resin Bed

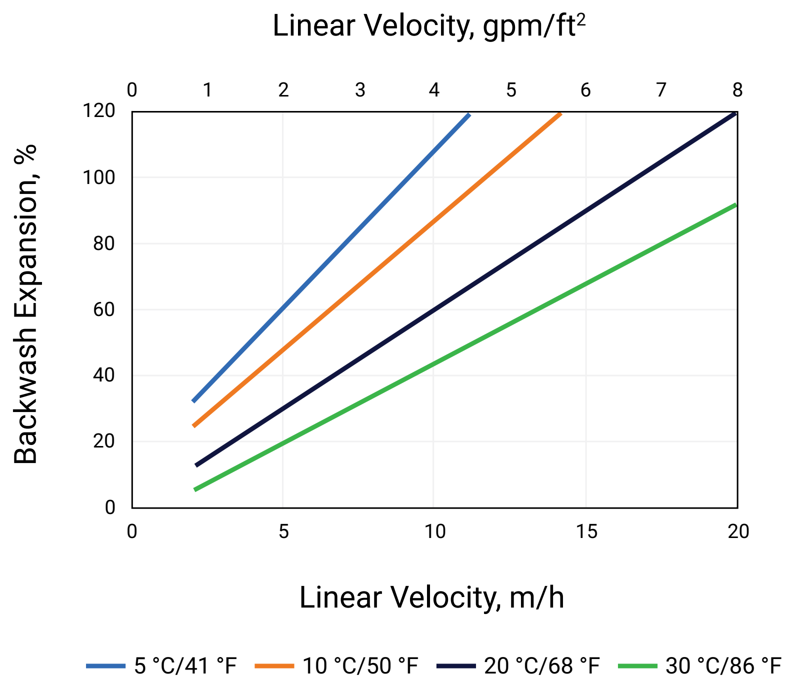
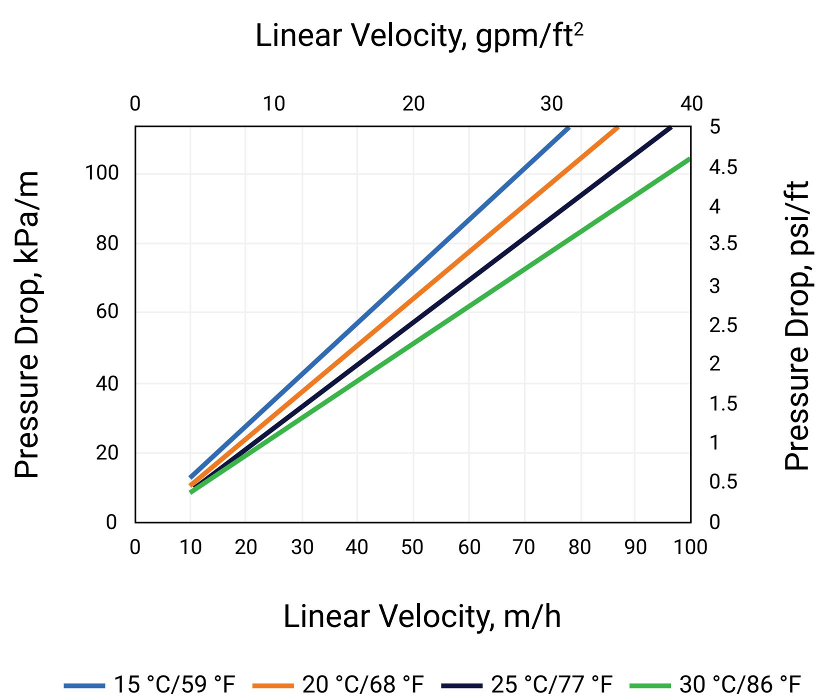


FIGURE 2

Pressure Drop Across Resin Bed



Ecolab is a global developer, manufacturer, and supplier of Purolite™ Resins including ion exchange, catalyst adsorbent and advanced polymers that make the world cleaner and healthier.

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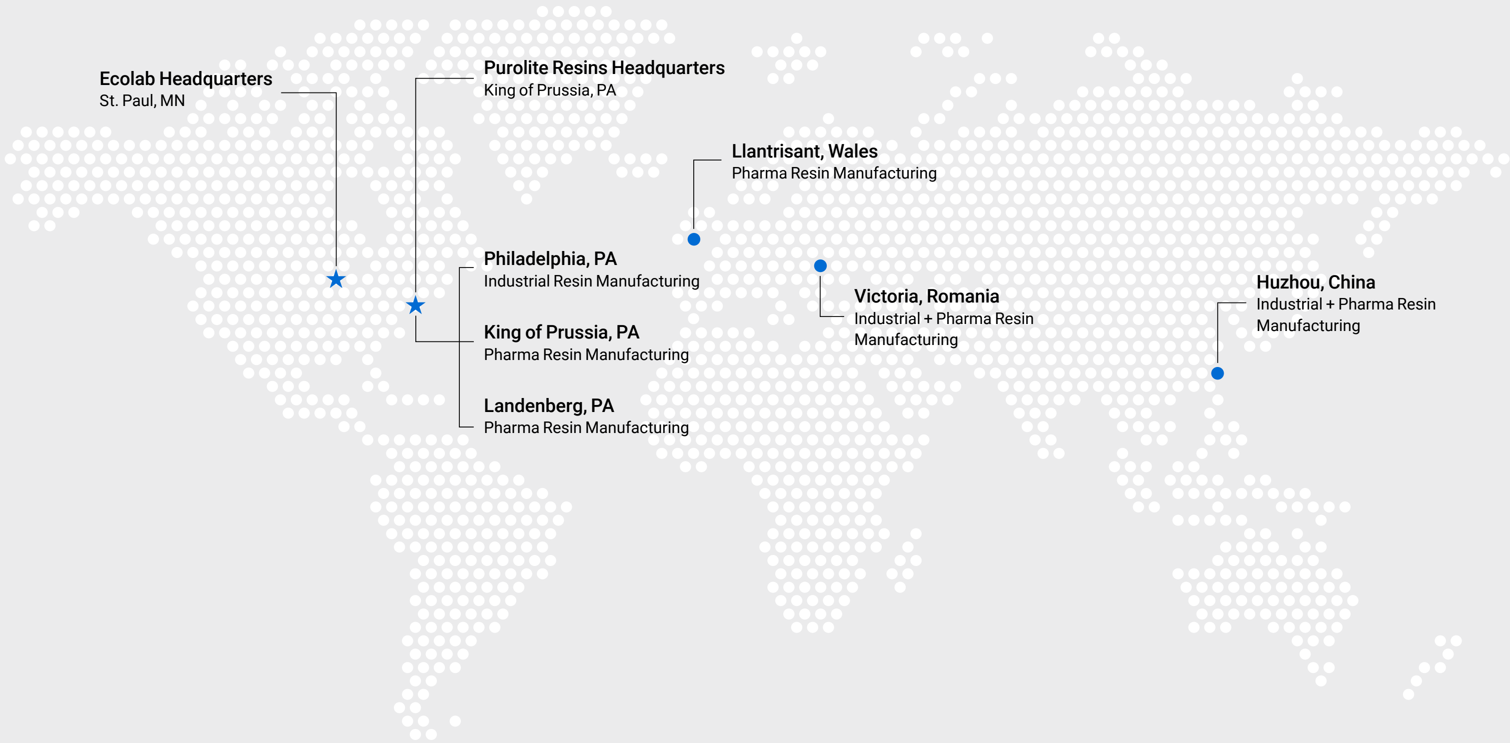

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