POLYMER BEADS FOR SELECTIVE METAL CAPTURE
Magpie Polymers provides an innovative and patented filtration technology for the selective removal of transition metals from industrial waste and process water. By selectively recovering the metal content, our clients obtain a net economic advantage.

TARGET METALS
• Palladium
• Platinum
• Rhodium
• Ruthenium
• Gold

MAGPIE'S ADVANTAGES: the MPX-series

The MPX series consists of five resins with extreme selectivity for PGMs and gold:
• MPX-310, MPX-316: very low affinity towards common metals and silver, resistant to oxidation.
• MPX-315, MPX-317: not disturbed by presence of organics
• MPX-318: increased rhodium affinity, high loading capacity (19% mass)

The Selectivity Advantage
With better selectivity than any other filtration medium, Magpie’s MPX-series resins recover PGM and gold in the presence of high amounts of other metals, organics, salinity or hard water. The MPX materials are characterized by strong affinity for PGM metals as illustrated in the following order and graph below:

Pt, Pd ≥ Ru, Au, Rh, Ir >> Cu, Ag, Ni, Fe, Pb, Sn, Zn, Al >>> Na, K, Mg, Ca

The Harsh Conditions Advantage
Magpie resins are able to deliver superior performance in extreme conditions including:
• Wide ranges of pH inc. concentrated acid
• Highly oxidizing conditions
• High salinity

“Selectivity is the key to any successful recycling process, and it is selectivity that makes Magpie stand-out from its substitutes”

Dr. Steve Van Zutphen, CEO
EXAMPLES OF SPECIFIC APPLICATIONS:
Typical solutions on which MPX-series resins give excellent performance and high yield of PGM recovery:

**PGM removal in silver refining processes**
Solution contains: 10-15% HNO3, Cu (> 30g/l), Ni, Fe, and Sn with traces of Pt, Pd, Rh, Ru, and Au.
- MPX-310 captures 98% of PGM
- None of the other elements are captured

**PGM removal from oxidizing acids**
Solution contains: 15-20% HCl, Cu (> 60g/l), Ni (2 g/l), Zn, and Pt/Pd (45mg/l)
- MPX-317 captures 97% of Pt and Pd
- None of the other elements are captured

**Highly selective gold recovery**
Solution contains: Ca (>8g/l), Mg, Na, Al, Cu, Fe, Pb, and Au (4.5mg/l)
- MPX-318 captures 99% of Au
- None of the other elements are captured

MAGPIE'S TECHNOLOGY

**Metal recovery**
The purely organic support of the MPX-series make them compatible with standard fuming or incineration processes where the metals are recovered from ashes as illustrated below.

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 clean resin  saturated resin  recovered metal
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“Stable phosphine oxides form coordination bonds between our resin and the target metals, which yields distinct bond strength and remarkable selectivity”

Dr. Vladica Bocokic, Head of R&D

**Physical Properties**
- **Physical form**: Off-white macroporous beads, containing 10-15% water
- **Functional group**: Various bidentate / phosphine oxide
- **Max. absorption capacity**: 1.5 to 1.9 mol/l
- **Particle size**: 0.5-1.0 mm
- **Swelling properties**: 13-30 vol %
- **Density**: 1.1 kg/l
- **Storage**: Stable at temperatures between 5-40°C. Freezing temperatures can damage the beads permanently. Maximum storage 2 years.

**Recommended Operating Conditions**
- **Operating temperature**: 0 < 80°C
- **Temperature resistance**: < 200°C
- **Flow for packed-bed**: < 10 BV/h
- **Performs well in**: 5-25% HNO3, 20% HCl or HCl/HNO3
- **Operating pH**: 0 - 8
- **Metal Recovery Process**: Fuming, incineration

NEXT STEPS
- Send us a sample of your effluent and get the performance lab results of the MPX resins, or
- Visit our website at [www.magpie-polymers.com](http://www.magpie-polymers.com), fill out the Preliminary Assessment Form and you will receive our expert’s opinion on your specific case free of charge