Building on nearly fifty years of unsurpassed resin handling experience, Graver offers ion exchange resin processing services that produce exceptionally high quality, high purity products with excellent lead times. Manufacturers prefer Gravex IX resin processing to serve customers quickly and efficiently while maintaining high brand recognition.

Gravex IX processing services – for strongly acidic cation, strongly basic anion, weakly acidic cation, and weakly basic anion exchange resins – meet stringent specifications and application requirements. We accommodate custom needs, including NDAs, for any specific processing parameters.

**GRAVEX IX RESIN PROCESSING SERVICES INCLUDE:**

**CONVERSIONS**
- Highest conversion levels for Anions (OH, SO₄, Citrate) and Cations (Na⁺, H⁺, NH₄⁺, Ca²⁺, Li⁺, Li⁺)

**PURIFICATION**
- Rinsing Services: Lowest Levels of Leachables and Extractables
- UPW – Electronic Grades
- US FDA Food Grade Compliance
- Cycling for Irreversible Swelling and Cleanup

**BLENDING**
- Uniform Blends of all Resin Ratios

**PARTICLE SIZE REDUCTION**
- Reduction to Smallest Sizes for Critical Applications

**CONVERSIONS**
- Component Regeneration
  - Proprietary practices ensure highest conversion levels
- Regeneration Batch Size
  - As large as 400 – 440 ft³ starting form (Smaller batches can also be processed)

Each conversion is maintained as a discrete batch and tracked from receipt through processing and final packaging. Nuclear Grade, Condensate Grade, and other standard quality levels are available.

Anion exchange resin is often regenerated and used in the hydroxide form. Our process achieves very high conversion for all applications. Conversion to other ionic forms is available.

Cation exchange resins are most often used in the hydrogen form for high purity applications. Some customers may have additional high purity needs for Lithium-7 and Lithium-6 Nuclear Grade products. Conversion to other ionic forms is available to meet the needs of the application.

At customer request, packaging can accommodate:
- Standard fiber drums/polyethylene liners – 1, 5, or 7 cubic foot or 200-liter size
- Polyethylene drums/polyethylene liners – 50-liter most common
- Supersacks with/without discharge spout – 1-cubic meter or other common size
PURIFICATION

Though resins are routinely rinsed during the original manufacturing process, many nuclear customers now demand higher purity levels. Leachable impurities can result in measurable amounts in steam generators and reactors up to actionable levels. Ion exchange resin impurities must remain at the lowest possible level to meet operating parameters and guidelines.

CATION

TOC and/or sulfate may reside inside the cation resin bead and can be difficult to remove. Typically, these contaminants are leachable and would be evident during use. Graver’s proprietary process cleans the resin and limits leachable levels.

This cycling process alternates treatments with acids, bases or salts that shrink and swell the resin beads to more effectively remove contaminants. Final stages include complete regeneration and extensive rinsing. This process prepares resins for loading and minimizes on-site rinsing times.

ANION

Depending upon the original manufacturing process and rinsing, anion exchange resins may contain residual organic chlorine. Leachable organic chlorine breaks down to inorganic chloride in steam generators and reactors, hampering effective operation.

Graver Technologies has developed new test methodology to accurately measure the leachable organic chlorine; previous methodology did not completely measure the organic at these levels and indicated out-of-spec resin to be acceptable. Further, our enhanced process capabilities address this specific concern in anion exchange resins from any source.

PURIFICATION (CYCLING)

For some applications, multiple exhaustion/conversion cycles are required to achieve optimal performance. Some IX resin products, especially weakly acidic cations and weakly basic anions, may need cycling and further cleaning to reduce impurities and address the irreversible swelling that may result upon first use.

Gravex IX performs one or more complete exhaustion and conversion cycles as needed.

PURIFICATION (UPW RINSING)

Our low TOC, Ultra Pure Water system prepares resins for the electronic industry’s stringent requirements. Resins are loaded into a specially designed vessel and rinsed with UPW grade water to achieve TOC requirements for the application. TOC is monitored during the rinse process and typical levels are a delta TOC of 10ppb, 5ppb, or lower.

BLENDING

Cation and anion exchange resins are often used to prepare mixed beds for the highest quality operation. Different applications require various ratios of the two resins. Uniformity of the mix can be very important.

Our proprietary techniques achieve excellent ratio uniformity in mixed beds. This can be especially important for Nuclear Grade resins, including the high-purity, high-value 7Li cation/OH anion mixed bed. Many products are blended in a stoichiometric mix, to provide equal cation and anion capacity in the mixed bed. Graver prepares any and all ratios, including custom requests.

PARTICLE SIZE OPTIMIZATION

Some ion exchange applications require a smaller, powdered resin particle size, which is reduced by an approximately an order of magnitude over the standard bead resins.

In addition to the Powdex® process invented by Graver, other applications benefit from powdered resins’ vastly improved kinetics.

Our processing services further mill resins to an approximate average 10 µm particle size. A low crosslinked, small particle size, chloride form anion is used for cholestyramine.