

AG Resins

Family Members

- AG 50W Resin
- AG 1 and AG 2 Resins
- AG 501 Resin

Available Variations

- Various crosslinkages
- Various functional groups (-H, -OH, -Cl, -Na, -NO₃⁻, -CH₃COOH)
- Strong and weak anion and cation exchange
- Mixed-bed ion exchange

At a Glance

AG (Analytical Grade) Resins are a microporous copolymer of styrene and divinylbenzene. These resins are extensively purified to remove both organic and inorganic impurities. They are sized to give consistent narrow wet mesh ranges, which provide high resolution and excellent reproducibility in multiple applications. They are available in several ionic forms and can be converted from one to another. They can be stored at ambient temperatures and are stable for at least 2 years when stored as recommended. They are available in numerous sizes to aid laboratory- to manufacture-scale purifications.

Wet Mesh and Equivalent Micron Diameters

Wet Mesh (U.S. Standard)										
16	20	40	50	80	100	140	200	270	325	400
Micron Diameter (1 μm = 0.001 mm)										
1,180	850	425	300	180	150	106	75	53	45	38

Approximate Molecular Weight (MW) Exclusion Limits for Ion Exchange Resins in Water

Crosslinkage, %	Approximate MW Exclusion Limit for Globular Molecules
2	2,700
4	1,400
8	1,000
10	800
12	400

AG 50W Resin**Features**

- Strong basic cation exchanger
- Functional group: sulphonic acid
- Available as 2, 4, 8, and 12% crosslinked versions

AG 50W Technical Specifications

Property	Description
Minimum wet capacity	2% crosslinkage: 0.6 meq/ml 4% crosslinkage: 1.1 meq/ml 8% crosslinkage: 1.7 meq/ml 12% crosslinkage: 2.1 meq/ml Macroporous (MP): 1.5 meq/ml
Recommended linear flow rate	Removing trace ions: 5–10 cm/hr Separations with very few components: 1–3 cm/hr Separations of multicomponent samples: 0.3–1.0 cm/hr Using high-resolution resins with small particle size: 0.1–0.2 cm/hr

Applications

- Ultra purification of buffers and ionic reagents
- Sample preparation
- Separation of metals, weak acids, peptides, amino acids, and nucleotides

AG 1 and AG 2 Resins**Features**

- Strong basic anion exchangers
- Functional group: quaternary ammonium
- AG 1 Resins available as 2, 4, and 8% crosslinked versions
- AG 2 Resins similar to AG 1 Resins but less basic and less resistant to oxidation

AG 1 and AG 2 Technical Specifications

Property	Description
Minimum wet capacity	2% crosslinkage: 0.6 meq/ml 4% crosslinkage: 1.0 meq/ml 8% crosslinkage: 1.2 meq/ml
Recommended linear flow rate	Removing trace ions: 5–10 cm/hr Separations with very few components: 1–3 cm/hr Separations of multicomponent samples: 0.3–1.0 cm/hr Using high-resolution resins with small particle size: 1.0–2.0 cm/hr

Applications

- Ultra purification of buffers and ionic reagents
- Separation of metals, peptides, proteins, and nucleic acids
- Sample preparation and enzyme assays
- Nitrate removal
- Purification of sugar compounds
- Fermentation applications

AG 501 Resin**Features**

- Mixed-bed ion exchanger containing equivalent amounts of AG 50W-X8, a strong cation exchange resin, and AG 1-X8, a strong anion exchange resin
- Available with blue dye that functions as a visual indicator
- Available as
 - Molecular biology grade AG 501-X8, certified to contain no endo- or exonucleases and no ligase inhibitors
 - Biotechnology grade AG 501-X8, certified to contain <100 microorganisms/gram

AG 501 Technical Specifications

Property	Description
Minimum wet capacity	8% crosslinkage: 1.8 meq/ml
Recommended linear flow rate	Removing trace ions: 5–10 cm/hr Separations with very few components: 1–3 cm/hr Separations of multicomponent samples: 0.3–1.0 cm/hr Using high-resolution resins with small particle size: 1.0–2.0 cm/hr

Applications

- Water softening
- Waste treatment in nuclear power plants to remove radioactive substances from water
- Deionizing urea, acrylamide, formamide, glyoxal, or polyethylene glycol
- Condensate polishing

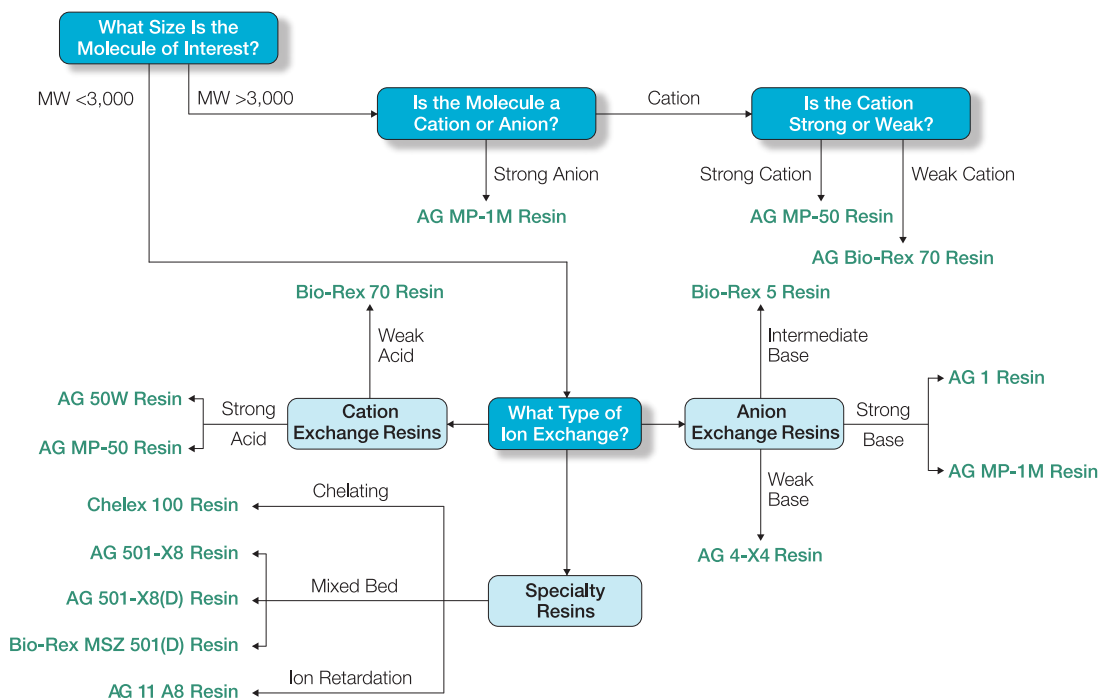
Other AG Resins

- **AG MP-1M Anion Exchange Resin** — macroporous equivalent of AG 1 Resin
- **AG 11 A8 Resin** — ion retardation resin, extremely useful for chromatographic desalting or removing acid from nonionic molecules. Available in both analytical and biotechnology grades

AG Resin Resources

Use the analytical grade schematic and selection guide to select an appropriate AG Resin.

Analytical Grade Ion Exchange Chromatography



AG Resin Selection Guide

1. Select the appropriate chemistry: cation or anion exchange resin.

- Cation exchange resins are suitable for positively charged (basic, high pH) components
 - AG 50W, AG MP-50, Bio-Rex 70
- Anion exchange resins are used to bind various negatively charged (acidic, low pH) species
 - AG 1, AG MP-1, AG 2, AG 4, Bio-Rex 5

2. Select the appropriate crosslinkage.

- For molecules <2,700 Da, choose between the 2, 4, 8, and 12 percentage crosslinked resins. For example:
 - AG 1-X2, AG 1-X4, AG 1-X8
 - AG 50W-X2, AG 50W-X4, AG 50W-X8, AG 50W-X12
- For molecules >2,700 Da, use the macroporous form. For example, AG MP-1 or AG MP-50
- Cation and anion exchange resins are also available in strong and weak forms, providing additional separation mechanisms
 - Use a weak exchanger to bind strongly adsorbing components
 - Use a strong exchanger to bind weakly adsorbing molecules

- Counterion considerations: Choosing the appropriate counterion is critical for ensuring good binding of the molecules to be isolated or removed. In general, use an ionic form with a lower selectivity than the sample ions to be adsorbed. The sample ions are adsorbed when introduced and desorbed by introducing an ion with a higher affinity for the resin, or a high concentration of an ion with the same or lower selectivity. If the selectivity of the analyte is unknown, we recommend the H⁺ or OH⁻ form

3. Choose the proper grade.

- Analytical grade is a highly purified, narrowly sized grade, ideal for most analytical applications
- Biotechnology grade ensures additional purity with certification that fewer than 100 microorganisms per dry gram are present
- Molecular biology grade is useful for nucleic acid applications and certified to be free of endo- and exonuclease activity, as well as ligase inhibitors

4. Choose the proper mesh size. Mesh size and particle size are inversely related. The larger the mesh size number, the smaller the particle size.
- Large mesh resin (20–50 and 50–100 mesh) is used primarily for large preparative applications and batch operations where the resin and sample are slurried together
 - Medium mesh resin (100–200 mesh) is used primarily in column chromatography for analytical- and laboratory-scale preparative applications
 - Fine mesh resin (200–400 mesh) is used for high-resolution analytical separations

Note: If uncertain, we recommend the 100–200 mesh size.

All AG Resins come with regulatory support. Large bulk volumes and special packaging for industrial applications are available on request.

For technical/product support or to request a quote, email your regional Bio-Rad representative or contact customer service at 1-800-4-BIORAD (1-800-424-6723).

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Visit [bio-rad.com/AGResins](https://www.bio-rad.com/AGResins) for more information and download our Process Resin Selection Guide ([bulletin 6713](#)) for technical and ordering information.

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