

## Key Advantages of Using Ion Exchange Resin Over Activated Carbon for PFAS Removal

### 1. Higher Selectivity for PFAS Compounds

- **Ion Exchange:** Ion exchange resins are specifically designed to target and capture PFAS compounds with high selectivity. This allows for more effective removal, even at low concentrations.
- **Carbon:** While GAC can adsorb PFAS, it is less selective and may adsorb a wider range of substances, including non-target contaminants, reducing its efficiency for PFAS removal.

### 2. Higher Removal Efficiency

- **Ion Exchange:** IX can achieve near-complete removal of PFAS, particularly long-chain PFAS, at much lower concentrations. The process is highly efficient, even in challenging situations with varying PFAS mixtures.
- **Carbon:** GAC may have reduced removal efficiency over time due to saturation and competition with other contaminants, especially in complex water matrices.

### 3. Faster Process

- **Ion Exchange:** IX systems typically offer faster kinetics for PFAS removal compared to GAC. The ion exchange process can operate efficiently at lower contact times.
- **Carbon:** GAC generally requires longer contact times to achieve similar removal efficiencies, which can increase the footprint and operational time of the treatment system.

### 4. Lower Secondary Waste Generation

- **Ion Exchange:** Regeneration of ion exchange resins produces fewer secondary wastes (e.g., spent carbon waste) compared to GAC, where spent media must be disposed of or regenerated, often resulting in more waste.
- **Carbon:** GAC, once saturated, must be replaced or regenerated, generating waste that often requires disposal in landfills or specialized treatment.

Ion Exchange Resin = IX  
Granular Activated Carbon = GAC



## 5. Better Performance in Low Concentrations

- **Ion Exchange:** Ion exchange resins tend to be more effective in treating low concentrations of PFAS, which is common in many contaminated water supplies.
- **Carbon:** GAC may become less effective at lower PFAS concentrations and may require larger media volumes or additional treatment stages to achieve adequate removal.

## 6. Flexibility in Targeting Specific PFAS

- **Ion Exchange:** Ion exchange can be designed to target specific classes of PFAS (e.g., long-chain versus short-chain PFAS), providing more tailored treatment options.
- **Carbon:** GAC is less flexible in distinguishing between different PFAS compounds and may adsorb a variety of other substances, making it less efficient for targeting only PFAS.

## 7. Compact and Scalable Systems

- **Ion Exchange:** IX systems are often more compact and easier to scale, especially for applications where space or system size is a concern.
- **Carbon:** GAC systems may require more space due to the need for larger media volumes or multiple stages to achieve similar levels of PFAS removal.

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In summary, ion exchange offers higher selectivity, efficiency, and flexibility for PFAS removal, often making it a better choice compared to activated granular carbon, especially in low-concentration or complex PFAS-contaminated water situations.

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