

# Ion Exchange in the **Ethanol Industry**



# Introduction



The global production of ethanol is a rapidly growing industry. Ethanol is used mainly as an environmentally friendly fuel and requires ion exchange catalysts during the production process. The distillation of ethanol and other alcohols is a more extensive and complex process, involving more complex treatment techniques.

ResinTech's catalyst products have been used in the ethanol industry as effective media for esterification, condensation, epoxidation, acylation, hydrolysis, hydration, alkylation and isomerization.

# Applications

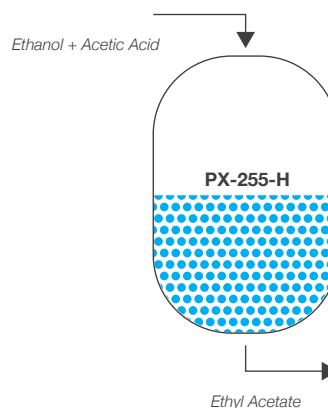
## ETHANOL DECATIONIZATION/ESTERIFICATION

Ethanol esterification is initiated using a catalyst like sulfuric acid. Since homogeneous catalyst reactions suffer from drawbacks such as the difficulty in separating the catalyst from the reaction mixture, many producers have replaced homogeneous catalysts with solid acid catalysts. Cation exchange resins have been proven to be effective solid acid catalysts in esterification reactions.

ResinTech manufactures a wide range of catalysts. ResinTech **PX-255-H** is a highly acidic catalyst designed for fast and complete reactions, including ethanol purification by cation removal. This is the first step for ethanol demineralization and is followed by treatment with ResinTech **PX-A70-OH** acid neutralization catalyst. When esterification reactions are required, the PX-255-H is the best choice because of its highly reticulated polymeric aliphatic macroporous structure. The reaction kinetics between the reactants is fast and complete due to the unique sponge-like surface and large functionalized pores.



### Ethanol Esterification:



Product Name	Resin Type	Form	Water Retention	Total Capacity	Advantages
<b>PX-255-H</b>	PS/DVB/Macroporous	H	51 - 57%	1.90 eq/L	Very high exchange kinetics

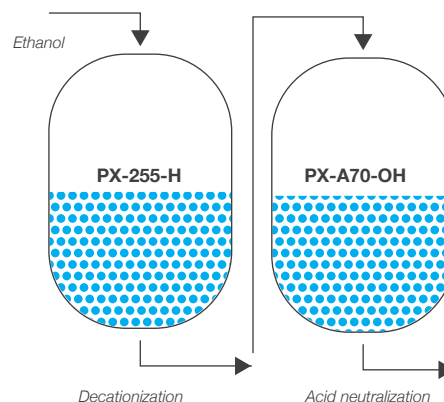
## ETHANOL ACID NEUTRALIZATION/GLYCOL PURIFICATION

Acetic acid is the main residual acid in fuel ethanol product. The corrosive nature of acetic acid, particularly in liquid form, may cause corrosive leaching of metals from conduits, reactors, and other vessels in the processing equipment. Ion exchange media is used to control the concentration of acetic acid and reduce its detrimental effects.

ResinTech **SCM-56-A-OH** has been designed as a fast reaction catalytic media for aldol condensation and acids removal from chlorinated hydrocarbons and phenol-acetone solutions. It can easily remove mercaptans from alcohols such as methanol in etherification processes. ResinTech **PX-A70-OH** is designed for acids neutralization from chlorinated hydrocarbons and phenol removal from benzene solutions. Because of its large polymeric macroporous structure, the PX-A70-OH can remove large organic molecules from monomer streams of hydroquinone, hydroquinone monoethyl ether, tertiary butyl catechol, etc.



### Ethanol Purification:



Product Name	Resin Type	Form	Water Retention	Total Capacity	Advantages
<b>PX-A70-OH</b>	PS/DVB/Macroporous	OH	54 - 62%	1.30 eq/L	Very high acid neutralization capacity
<b>PX-A60-OH</b>	PS/DVB/Macroporous	Cl	66 - 75%	0.80 eq/L	Medium acid neutralization capacity

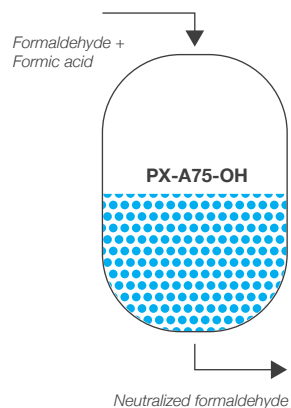
## ALDEHYDE ACID NEUTRALIZATION

ResinTech catalysts are widely used as purification media for polar and non-polar fluids. The catalysts have a highly reticulated and functionalized macroporous polymeric structure that allows a fast and complete acid neutralization deep inside the catalyst beads.

ResinTech **PX-A75-OH** has been designed as a fast-acting catalytic media for mineral and organic acids neutralization from aldehydes solutions such as formaldehyde. It can easily neutralize and reduce formic acid content in formaldehyde solutions due to its large pore polymeric macroporous structure.



### Aldehyde acid neutralization:



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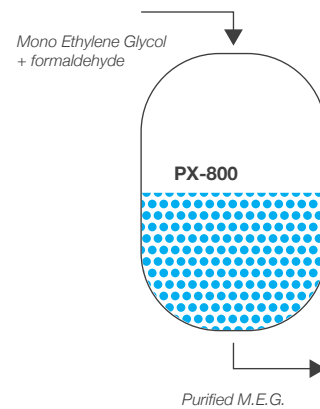
Product Name	Resin Type	Form	Water Retention	Total Capacity	Advantages
<b>PX-A75-OH</b>	PS/DVB/Macroporous	OH	54 - 62%	1.30 eq/L	Fastest acid neutralization

## GLYCOL ALDEHYDE REMOVAL

ResinTech manufactures an aldehyde removal catalyst for glycols purification. The PX-800 is a highly basic gellular catalyst in sulfite form. Because of its nature, the aldehyde removal reaction is instantaneous, allowing a complete aldehyde removal from polar and non-polar fluids. The **PX-800** allows a reverse reaction to release the captured complexed aldehyde, resulting in a fully reactivated catalyst suitable for reuse. The PX-800 also removes dissolved oxygen, thereby helping to minimize corrosion within the system.



### Glycol aldehyde removal:



Product Name	Resin Type	Form	Water Retention	Total Capacity	Advantages
<b>PX-800</b>	PS/DVB/Gel	SO <sub>3</sub> <sup>2-</sup>	52 - 63%	0.80 eq/L	Very high exchange kinetic



## Industry-leading Technical Support

Our legendary technical support team combines the world's leading IX scientists, most sophisticated laboratory, and advanced ion exchange simulation technology to solve the most challenging water quality dilemmas. We can conduct a detailed analysis of your influent or effluent, model your application's environment in a "virtual" setting, and provide product or process recommendations to ensure optimal water treatment operations for virtually any case. Reach out to us for help at [techsupport@resintech.com](mailto:techsupport@resintech.com) or scan the QR code below.

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