

1. ION EXCHANGE RESINS AS ACTIVE PHARMACEUTICAL INGREDIENTS

Polymeric ion exchange resins are totally insoluble, and, when taken orally, pass through the human digestive system without being adsorbed. Ingestion of specific resins, therefore, has no side effects on the human body (that is, they are non-systemic). The properties of ion exchange resins used specifically as active ingredients are well documented, and their characteristics are clearly defined in various pharmacopoeias.

Sodium / Calcium Polystyrene Sulphonate

The kidneys continuously remove potassium. When kidney function is failing, it may be necessary to remove potassium from the intestinal tract by artificial means. This can be achieved by using Polystyrene Sulphonates, in either the sodium or calcium form. Sodium Polystyrene Sulphonate is listed in both in the US and EU pharmacopoeias, while Calcium Polystyrene Sulphonate is listed only in the European pharmacopoeia. As the resins pass through the intestinal tract they exchange the sodium or calcium on the resin for potassium. The adsorbed potassium cannot pass into the blood and continues through the body without being released. Introduced into clinical use in the early 1950's, such resins are now widely used in the treatment of acute and chronic hyperkalaemia, in addition to controlling serum potassium levels in patients undergoing renal dialysis.

Purolite C100NaMR and **Purolite C100CaMR** are solvent or solvent free strong acid cation resins produced in Purolite's FDA clean rooms. The powder resin is subsequently flavored by the pharmaceutical company and prepared in doses to be taken orally.

Cholestyramine

Cholesterol is essential for human and animal life, but an excess of cholesterol in the blood is one of the most important and recognized risk factors in cardio-vascular disease. Cholesterol is converted by the liver into bile acids, which, when discharged into the duodenum, emulsify ingested fats, thereby assisting digestion. The bile acids are absorbed through the intestine and are returned to the liver, where they are converted, through a chain of reactions, to low density lipoprotein (LDL) cholesterol. The metabolism of cholesterol is subject to a delicate balance. This balance can be disrupted to the point where there is such a high accumulation of LDL cholesterol in the blood that it precipitates as cholesteryl esters on the walls of blood vessels, restricting flow and leading to potential heart attacks. It can, therefore, be advantageous, in such cases, to reduce cholesterol levels.

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Cholestyramine is a non-absorbable, non-metabolisable anion exchange resin which, by complexing the bile acids, prevents their re-absorption and allows them to pass through the body. The reduction of bile acids causes a depletion of hepatic

cholesterol, which, in turn, stimulates the transformation of LDL cholesterol into hepatic cholesterol, thereby reducing LDL cholesterol levels and lowering the total cholesterol level in the blood.

The advantage of Cholestyramine over other drugs is that there are little side effects. Besides the treatment of hypercholesterolemia, Cholestyramine has other medical applications, such as: improving diarrhoeal states by significantly reducing the activity of endotoxins; treating vitamin D3 overdose; and as recent studies indicate, regression in arteriosclerosis.

Listed in pharmacopoeia as “**Cholestyramine**”, **Purolite A430MR** is a powdered anion exchange resin in the chloride form. The powder resin is flavored by the pharmaceutical company, and prepared in doses to be dispersed in water or fruit juice for oral consumption.

Antacid

Purolite A830EMR is an antacid used to control gastric acidity in the treatment of peptic ulcers. It is a powdered weak base anion exchange resin, in free base form. **Purolite A830EMR** is an ideal antacid as: it is insoluble; it is neutral in aqueous suspensions; it does not irritate the stomach or intestine; it does not alter the acid-base equilibrium of the body; it does not alter mineral metabolism; it has no side effects; and it does not cause diarrhea or constipation.

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