

# Sodium Polystyrene Sulphonate

C<sub>8</sub>H<sub>8</sub>O<sub>3</sub>S

Mol. Wt. 184.2

Sodium polystyrene sulphonate is a cation-exchange resin prepared in the sodium form. Each g of sodium polystyrene sulphonate exchanges not less than 110 mg and not more than 135 mg of potassium, calculated on the anhydrous basis.

**Category.** Pharmaceutical aid.

**Description.** Golden brown, fine powder.

## Tests

**Limit of ammonium salts.** Disperse 1 g of the substance under examination in 5 ml of 1 M sodium hydroxide in a 50 ml beaker. Cover the beaker with a watch glass containing a moistened strip of red litmus paper on the underside and allow to stand for 15 minutes, the litmus paper shows no blue color.

**Sodium content.** Not less than 9.4 per cent and not more than 11.5 per cent, calculated on the anhydrous basis.

**Solution A.** A 2.0 per cent w/v solution of low-sodium, low potassium non-ionic surfactant (Such as Activator 90) in water.

**Reference solution.** Dissolve a suitable quantity of sodium chloride in water to obtain a solution containing 5.0 mg of sodium per ml.

**Reference solution graph.** Into four 1-liter flasks pipet, respectively 0, 1, 2, and 3 ml of reference solution. To each flask add 0.1 ml of nitric acid, 0.1 ml of sulphuric acid, and 10 ml of solution A, dilute with water to volume, and mix. Adjust the scale of a suitable flame spectrophotometer to a reading of 100 at a wavelength of 588 nm with the solution containing 15 mg of sodium per litre. Determine the instrument readings on the other three solutions, and plot the observed readings, on ruled coordinate paper, as the ordinate, and the concentration of sodium, in mg per litre, as the abscissa. The line intersects the ordinate at, or below, a scale reading of 25 ("blank reading").

**Procedure.** Ash the equivalent of 1 g of substance under examination, with a slight excess of sulphuric acid. Add 1 ml of nitric acid and a few ml of water to the residue. Warm to dissolve, and transfer with water to a 1 liter volumetric flask, dilute with water to volume, and mix. Pipet 10 ml of this solution into a 100 ml volumetric flask, add 1 ml of solution A, dilute with water to volume, and mix. Determine the instrument reading concomitantly with the readings obtained for plotting the reference solution, and determine the sodium concentration, in mg per litre, by interpolation from the reference solution graph. Calculate the percentage of sodium, using following expression:

$$A/W$$

Where, A is the weight, in mg, of sodium found per litre and W is the weight, in g, of sodium polystyrene sulphonate taken.

**Heavy metal (2.3.13).** 1.0 g complies with limit test for heavy metals, Method B (20 ppm).

**Water (2.3.43).** Not more than 10 per cent.

## Potassium exchange capacity.

**Solution A.** A 2.0 per cent w/v solution of low-sodium, low potassium non ionic surfactant (such as Activator 90) in water.

**Reference solution (a).** Dissolve a suitable quantity of potassium chloride in water to obtain a solution containing 5.0 mg of potassium per ml.

**Reference solution (b).** Dissolve a suitable quantity of sodium chloride in water to obtain a solution containing 4.0 mg of sodium per ml.

**Reference solution graph.** Identify five 1-liter volumetric flasks by the numbers 1, 2, 3, 4, and 5. In that order pipet into the flasks 4, 3, 2, 1, and 0 ml, respectively, of reference solution (b), and in the same order 0, 1, 2, 3, and 4 ml, respectively, of reference solution (a). To each flask add 10 ml of solution A, dilute with water to volume, and mix. Adjust the scale of a suitable flame spectrophotometer to 100 with solution from flask 5 at 766 nm. Determine the instrument readings with solutions from flasks 4, 3, 2, and 1. On ruled coordinate paper, plot the observed instrument readings as the ordinate, and the concentrations, in

mg per liter, of potassium as the abscissa.

*Procedure.* Pipet 100 ml of reference solution (a) into a glass-stoppered flask containing about 1.6 g of sodium polystyrene sulphonate, accurately weighed, shake by mechanical means for 15 minutes, filter, and discard the first 20 ml of the filtrate. Pipet 5 ml of the filtrate into a 1-liter volumetric flask, add 10 ml of solution A, dilute with water to volume, and mix. Observe the flame spectrophotometer readings of the exchanged solution concomitantly with those obtained for plotting the reference solution graph, and determine the potassium concentration, in mg per liter, by interpolation from the reference solution graph. Calculate the quantity, in mg per g, of potassium adsorbed on the resin using following expression:

$$(X - 20Y)/W$$

Where, X is the weight, in mg, of potassium in 100 ml of reference solution (a) before exchange; Y is the weight, in mg, of potassium per liter as interpolated from the reference solution graph; and W is the weight, in g, of sodium polystyrene sulphonate taken, expressed on the anhydrous basis.

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**Solubility.** Page 293

**Insert** before, Sodium Propylparaben

**Sodium polystyrene sulphonate.** Insoluble in *water*