

Status: Currently Official on 14-Feb-2025
 Official Date: Official Prior to 2013
 Document Type: Reagents
 DocId: GUID-50C88D00-8CB0-46F8-9911-0189C8397031_1_en-US
 DOI: https://doi.org/10.31003/USPNF_R1772_01_01
 DOI Ref: gu3vd

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Cation-Exchange Resin, Styrene-Divinylbenzene

—A strongly acidic, cross-linked sulfonated resin containing about 2% of divinylbenzene. It is available in the hydrogen form in the 50- to 100-, 100- to 200-, and 200- to 400-mesh sizes. It can be regenerated to the hydrogen form by treating with a hydrochloric acid solution (5 in 100). For satisfactory regeneration, a contact time of at least 30 minutes is required after which it must be washed free of excess acid. It is insoluble in water, in methanol, and in acetonitrile. Suitable for use in column chromatography.

Moisture Content of Fully Regenerated and Expanded Resin: Transfer 10 to 12 mL of the resin (as received) to a flask, and convert it completely to the hydrogen form by stirring with 150 mL of hydrochloric acid solution (5 in 100) for not less than 30 minutes. Decant the acid, and wash the resin in the same manner with water until the wash water is neutral to litmus (pH 3.5).

Transfer 5 to 7 mL of the regenerated resin to a glass filtering crucible, and remove only the excess surface water by very careful suction filtration. Transfer the conditioned resin to a tared weighing bottle, and weigh. Dry in a vacuum oven at a pressure of 50 mm of mercury at 100° to 105° for 16 hours. Transfer from the vacuum oven to a desiccator, cool to room temperature, and weigh again. The loss in weight is between 75% and 83%.

Total Wet Volume Capacity: Transfer 3 to 5 mL of the regenerated, undried (See *Moisture Content* above) resin to a 5-mL graduated cylinder, and fill it with water. Remove any air bubbles from the resin bed with a stainless steel wire, and settle the resin to its minimum volume by tapping the graduated cylinder. Record the volume of the resin.

Transfer the resin to a 400-mL beaker. Add about 5 g of sodium chloride, and titrate, stirring well, with 0.1 N sodium hydroxide to the blue endpoint of bromothymol blue (pH 7.0).

$$(\text{net mL NaOH} \times N)/(\text{mL of resin}) = \text{mEq/mL}$$

The total wet volume capacity of the resin is more than 0.6 mEq per mL.

Wet Screen Analysis: The purpose of this test is to properly identify the mesh size of the resin. To obtain an accurate screen analysis would require a special apparatus and technique.

Add 150 mL of resin to 200 mL of water in an appropriate bottle, and allow it to stand at least 4 hours to completely swell the resin. Transfer, by means of a graduated cylinder, 100 mL of settled and completely swollen resin to the top screen of a series of the designated U.S. Standard 20.3-cm brass screens. Thoroughly wash the resin on each screen with a stream of water until the resin is completely classified, collecting the wash water in a suitable container. Wash the beads remaining on the respective screens back into the 100-mL graduate, and record the volume of settled resin on each screen. At least 70% of the resin will be within the specific mesh size.

[NOTE—A suitable resin is Dowex 50WX2, produced by Dow Chemical Co. (www.dow.com) and also available through Sigma-Aldrich (www.sigma-aldrich.com).]

Auxiliary Information - Please [check for your question in the FAQs](#) before contacting USP.

Topic/Question	Contact	Expert Committee
CATION-EXCHANGE RESIN, STYRENE-DIVINYLBENZENE	Margareth R.C. Marques Principal Scientific Liaison	HDQ Headquarters

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Pharmacopeial Forum: Volume No. Information currently unavailable

Current DocID: [GUID-50C88D00-8CB0-46F8-9911-0189C8397031_1_en-US](#)

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