Status: Currently Official on 16-Feb-2025
Official Date: Official as of 01-Aug-2022
Document Type: USP Monographs
DocId: GUID-415B77A2-AECA-4CF9-9303-7EDD951EE814_2_en-US
DOI: https://doi.org/10.31003/USPNF_M66240_02_01
DOI Ref: g29zt

Polyethylene Glycol 3350 and Electrolytes for Oral Solution

» Polyethylene Glycol 3350 and Electrolytes for Oral Solution is a mixture of Polyethylene Glycol 3350, Sodium Bicarbonate, Sodium Chloride, Sodium Sulfate (anhydrous), and Potassium Chloride. When constituted as directed in the labeling it contains not less than 90.0 percent and not more than 110.0 percent of the labeled amounts of polyethylene glycol 3350, potassium (K^+), sodium (Na^+), bicarbonate (HCO_3^-), chloride (Cl^-), and sulfate ($SO_4^=$), the labeled amounts per L being 10 mmol (10 mEq) of potassium, 125 mmol (125 mEq) of sodium, 20 mmol (20 mEq) of bicarbonate, 35 mmol (35 mEq) of chloride, and 40 mmol (80 mEq) of sulfate.

Packaging and storage—Preserve in tight containers.

USP Reference standards ⟨11⟩—
USP Polyethylene Glycol 3350 RS

Completeness of solution ⟨641⟩: meets the requirements.

Identification—

A: The IR absorption spectrum of a mineral oil dispersion of it in a calcium fluoride cell exhibits maxima only at the same wavelengths as that of a similar preparation of USP Polyethylene Glycol 3350 RS.

B: A solution (1 in 20) responds to the tests for *Sodium ⟨191⟩*, *Potassium ⟨191⟩*, *Bicarbonate ⟨191⟩*, *Sulfate ⟨191⟩*, and *Chloride ⟨191⟩*.

pH ⟨791⟩: between 7.5 and 9.5, in the solution prepared as directed in the labeling.

Uniformity of dosage units ⟨905⟩: meets the requirements.

Change to read:

▲**Osmolality and Osmolarity ⟨785⟩**

Osmolality:▲ *(Official 1-Aug-2022)* between 235 and 304 mOsmol, in the solution prepared as directed in the labeling.

Assay for potassium and sodium—

Mobile phase—Dilute 0.5 mL of nitric acid with water to obtain 4000 mL of solution. Degas, and place the solution in a suitable plastic container. Make adjustments if necessary (see *System Suitability* under *Chromatography ⟨621⟩*).

Internal standard solution—Dissolve a suitable quantity of ammonium bromide in water to obtain a solution having a concentration of about 2 mg per mL.

Standard preparation—To a 100-mL volumetric flask transfer about 90 mg of potassium chloride, previously dried at 105° for 2 hours and accurately weighed, and about 880 mg of sodium chloride, previously dried at 105° for 2 hours and accurately weighed, dilute with water to volume, and mix. Transfer 5.0 mL of this solution to a 500-mL volumetric flask, add 10.0 mL of *Internal standard solution,* dilute with water to volume, and mix. Pass this solution through a filter having a 0.5-µm or finer porosity, and store the filtrate in a suitable plastic container. This *Standard preparation* contains about 9 µg (0.00012 mEq) of potassium chloride and about 88 µg (0.0015 mEq) of sodium chloride per mL.

Assay preparation—Constitute the contents of a container of Polyethylene Glycol 3350 and Electrolytes for Oral Solution with an accurately measured volume of water, as specified in the labeling. Transfer 6.0 mL of this stock solution, equivalent to about 0.06 mEq of potassium, to a 500-mL volumetric flask, add 10 mL of *Internal standard solution,* dilute with water to volume, and mix. This solution contains about 0.00012 mEq of potassium and 0.0015 mEq of sodium per mL. [Note—Reserve the remaining portion of the stock solution for the *Assay for bicarbonate,* and reserve the remaining portion of the *Assay preparation* for the *Assay for chloride and sulfate* and the *Assay for polyethylene glycol 3350*.]

Chromatographic system (see *Chromatography ⟨621⟩*)—The liquid chromatograph is equipped with a conductivity detector, a 4-mm × 5-cm guard column containing packing L17, and a 4-mm × 30-cm analytical column maintained at 35 ± 1° containing packing L17. The flow rate is about 0.9 mL per minute. Chromatograph the *Standard preparation* as directed for *Procedure:* the relative retention times are about 0.6 for sodium, 0.8 for ammonium, and 1.0 for potassium; the resolution, *R,* between the sodium and ammonium peaks is not less than 1.1, and between the ammonium and potassium peaks is not less than 0.9. [Note—Maintain column backpressure at less than 1000 pounds per square inch. Backpressure may be reduced by changing the in-line filters and frits in the columns. Column efficiency may be improved by backflushing the analytical column with 30 mL of 0.1 N nitric acid or by injecting four successive 100-µL portions of 0.1 N nitric acid into the chromatograph.]

Procedure—[NOTE—Use peak heights where peak responses are indicated.] Separately inject equal volumes (about 10 µL) of the *Standard preparation* and the *Assay preparation* into the chromatograph, record the chromatograms, and measure the responses for the major peaks. Calculate the mEq of potassium per L of constituted Oral Solution taken by the formula:

$$(500/74.55)(C/6)(R_U/R_S)$$

in which 74.55 is the molecular weight of potassium chloride; C is the concentration, in µg per mL, of potassium chloride in the *Standard preparation;* and R_U and R_S are the peak response ratios of potassium to ammonium obtained from the *Assay preparation* and the *Standard preparation*, respectively. Calculate the mEq of sodium per L of constituted Oral Solution taken by the formula:

$$(500/58.44)(C/6)(R_U/R_S)$$

in which 58.44 is the molecular weight of sodium chloride; C is the concentration, in µg per mL, of sodium chloride in the *Standard preparation;* and R_U and R_S are the peak response ratios of sodium to ammonium obtained from the *Assay preparation* and the *Standard preparation,* respectively.

Assay for bicarbonate—Transfer 400.0 mL of the stock solution remaining from the *Assay for potassium and sodium*, equivalent to about 672 mg of sodium bicarbonate (8 mEq), to a suitable container, add methyl red TS, and titrate with 1 N sulfuric acid VS. Calculate the mEq of bicarbonate (HCO_3^-) per L of constituted Oral Solution taken by the formula:

$$2.5V_A$$

in which V_A is the volume, in mL, of 1 N sulfuric acid consumed.

Assay for chloride and sulfate—

Mobile phase—Transfer 34 g of boric acid, 8.6 g of lithium hydroxide, 23.5 mL of gluconic acid solution (1:1), and 125 mL of glycerin to a 1000-mL volumetric flask, dissolve in water, dilute with water to volume, and mix. Add 15 mL of this buffer solution to 865 mL of water, mix, and degas. Add 120 mL of acetonitrile, mix, and degas. [NOTE—Protect the *Mobile phase* from air to prevent absorption of carbon dioxide.] Make adjustments if necessary (see *System Suitability* under *Chromatography ⟨621⟩*). Increasing the proportion of buffer solution decreases the retention times of the analytes.

Internal standard solution—Dissolve a suitable quantity of ammonium bromide in water to obtain a solution having a concentration of about 2.2 mg per mL.

Standard preparation—To a 100-mL volumetric flask transfer about 246 mg of sodium chloride (4.2 mEq), previously dried at 105° for 2 hours and accurately weighed, and about 682 mg of anhydrous sodium sulfate (9.6 mEq), previously dried at 105° for 2 hours and accurately weighed, dilute with water to volume, and mix. Transfer 5.0 mL of this solution to a 500-mL volumetric flask, add 10.0 mL of *Internal standard solution*, dilute with water to volume, and mix. Filter this solution through a 0.5-µm or finer porosity filter, and store the filtrate in a suitable glass container. This *Standard preparation* contains about 24.6 µg of sodium chloride (0.00042 mEq of chloride) and about 68.2 µg of sodium sulfate (0.00096 mEq of sulfate) per mL.

Assay preparation—Use the *Assay preparation* prepared as directed in the *Assay for potassium and sodium*. This solution contains about 0.042 mEq of chloride and 0.096 mEq of sulfate per mL.

Chromatographic system (see *Chromatography ⟨621⟩*)—The liquid chromatograph is equipped with a conductivity detector, a 4-mm × 5-cm guard column containing packing L23, and a 4-mm × 30-cm analytical column maintained at 35 ± 1° containing packing L23. The flow rate is about 0.9 mL per minute. Chromatograph the *Standard preparation* as directed for *Procedure:* the relative retention times are about 0.25 for chloride, 0.4 for bromide, and 1.0 for sulfate, the resolution, *R,* between the chloride and bromide peaks is not less than 1.5 and between the bromide and sulfate peaks is not less than 4.5. [NOTE—Maintain column backpressure at less than 1000 pounds per square inch. Backpressure may be reduced by changing the in-line filters and frits in the columns. Column efficiency may be improved by backflushing the analytical column with 50 mL of the buffer solution used to prepare the *Mobile phase*.]

Procedure—[NOTE—Use peak heights where peak responses are indicated.] Separately inject equal volumes (about 10 µL) of the *Standard preparation* and the *Assay preparation* into the chromatograph, record the chromatograms, and measure the responses for the major peaks. Calculate the mEq of chloride per L of constituted Oral Solution taken by the formula:

$$(500/58.44)(C/6)(R_U/R_S)$$

in which 58.44 is the molecular weight of sodium chloride, C is the concentration, in µg per mL, of sodium chloride in the *Standard preparation*, and R_U and R_S are the peak response ratios of chloride to bromide obtained from the *Assay preparation* and the *Standard preparation*, respectively. Calculate the mEq of sulfate per L of constituted Oral Solution taken by the formula:

$$(500/71.02)(C/6)(R_U/R_S)$$

in which 71.02 is one-half of the molecular weight of sodium sulfate, C is the concentration, in µg per mL, of anhydrous sodium sulfate in the

Standard preparation, and R_U and R_S are the peak response ratios of sulfate to bromide obtained from the *Assay preparation* and the *Standard preparation*, respectively.

Assay for polyethylene glycol 3350—

Salt solution—Prepare a solution in water containing 0.35 mg of sodium chloride, 0.18 mg of potassium chloride, 0.40 mg of sodium bicarbonate, 1.37 mg of anhydrous sodium sulfate, and 0.88 mg of ammonium bromide per mL.

Mobile phase—Dilute 40.0 mL of *Salt solution* with water to 1000 mL. Make adjustments if necessary (see *System Suitability* under *Chromatography* ⟨621⟩).

Standard preparation—Transfer about 360 mg of USP Polyethylene Glycol 3350 RS, accurately weighed, to a 500-mL volumetric flask, add 20.0 mL of *Salt solution* and about 250 mL of water, dissolve by swirling, dilute with water to volume, and mix. This *Standard preparation* contains about 0.72 mg of polyethylene glycol 3350 per mL.

Assay preparation—Use the *Assay preparation,* prepared as directed in the *Assay for potassium and sodium*. This solution contains about 0.72 mg of polyethylene glycol 3350 per mL.

Chromatographic system (see *Chromatography* ⟨621⟩)— [Note—Use peak heights where peak responses are indicated.] The liquid chromatograph is equipped with a refractive index detector maintained at 34 ± 0.5°, a 7.8-mm × 4.5-cm guard column containing packing L25, and a 7.8-mm × 30-cm analytical column containing packing L25 and maintained at ambient temperature. The flow rate is about 1 mL per minute. Chromatograph the *Standard preparation* as directed for *Procedure:* the relative standard deviation for replicate injections is not more than 1.5%. [Note—Maintain column backpressure at less than 1000 pounds per square inch. Backpressure may be reduced by cleaning the frits in the guard column or by replacing the guard column. Baseline drift may be reduced by maintaining strict control of ambient temperature, by insulating the lines, the *Mobile phase* reservoir, and the columns, and by increasing the time of equilibration.]

Procedure—Separately inject equal volumes (about 20 µL) of the *Standard preparation* and the *Assay preparation* into the chromatograph, record the chromatograms, and measure the responses for the major peaks. Calculate the content, in g, of polyethylene glycol 3350 per L of constituted Oral Solution taken by the formula:

$$500(C/6)(r_U/r_S)$$

in which C is the concentration, in mg per mL, of polyethylene glycol 3350 in the *Standard preparation,* and r_U and r_S are the polyethylene glycol 3350 peak responses obtained from the *Assay preparation* and the *Standard preparation,* respectively.

Auxiliary Information - Please check for your question in the FAQs before contacting USP.

Topic/Question	Contact	Expert Committee
POLYETHYLENE GLYCOL 3350 AND ELECTROLYTES FOR ORAL SOLUTION	Documentary Standards Support	SM32020 Small Molecules 3
REFERENCE STANDARD SUPPORT	RS Technical Services RSTECH@usp.org	SM32020 Small Molecules 3

Chromatographic Database Information: Chromatographic Database

Most Recently Appeared In:
Pharmacopeial Forum: Volume No. PF 33(6)

Current DocID: GUID-415B77A2-AECA-4CF9-9303-7EDD951EE814_2_en-US
DOI: https://doi.org/10.31003/USPNF_M66240_02_01
DOI ref: g29zt