**BRIEFING**

**Potato Starch**, page 885 of *PF* 28(3) [May–June 2002]. The European Pharmacopoeia is the coordinating pharmacopeia for the international harmonization of the compendial standards for the *Potato Starch* monograph, as part of the process of international harmonization of monographs and general analytical methods of the European, Japanese, and United States pharmacopeias. The following monograph represents the **ADOPTION STAGE 6** document. The EP draft was based in part on comments from the Japanese Pharmacopoeia and the United States Pharmacopoeia in response to the Provisional Harmonized Text Stage 5A and 5B drafts prepared by EP. The current *NF* monograph for *Starch* will be proposed for deletion, to be replaced by *Corn Starch, Potato Starch,* and *Wheat Starch*.

### Pharmacopeial Discussion Group Sign-Off Document

<table>
<thead>
<tr>
<th>Attributes</th>
<th>EP</th>
<th>JP</th>
<th>USP</th>
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<tbody>
<tr>
<td>Definition</td>
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<td>Identification A</td>
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<td>Identification B</td>
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<td>Loss on drying</td>
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<td>Sulphated ash</td>
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**Legend:** + will adopt and implement; – will not stipulate.

**Nonharmonized attributes:** Characters, Microbial contamination, Storage.

**Specific local attributes:** Foreign matter (EP).

**Reagents and reference materials:** Each pharmacopeia will adapt the text to take account of local reference substances and spectra and reagent specifications.

Differences between the International Harmonization Adoption Stage 6 document for *Potato Starch* and the current *NF Starch* monograph include the following:

1. **Definition**— Changed to include only Potato Starch, as to conform to the individual monograph for Potato Starch.
2. **Packaging**— No change.
3. **Labeling**— Deleted.
4. Botanical characteristics— This test has been modified and moved to the Identification section.

5. Identification— A microscopic test is added that is similar to the Botanical characteristics section. The other two tests are modified slightly for clarification.

6. Microbial limits— The revised limit for the total combined molds and yeasts count in the test is based on comments received.

7. pH— No change.

8. Loss on drying— The revised test conditions reportedly correspond to ISO 1666 and are preferred by users of starches because of reduced testing time.

9. Residue on ignition— The standard for this test is increased from 0.5% to 0.6% in order to conform with EP standards.

10. Limit of iron— The test procedure is changed in order to conform to EP standards.

11. Limit of oxidizing substances— No change.

12. Limit of sulfur dioxide— The change in the standard reflects the corresponding limits proposed by the EC food laws.

13. Organic volatile impurities— This test is deleted because it is unnecessary.

(EMC: J. Lane) RTS—40773-6

Add the following:

▲ Potato Starch

» Potato Starch is obtained from the tuber of Solanum tuberosum L.

Packaging and storage — Preserve in well-closed containers.

Identification—

A: Under a microscope, using a mixture of glycerin and water (1:1) as a mounting agent, it presents granules, either irregularly shaped, ovoid, or pear-shaped, usually 30 µm to 100 µm in size, but occasionally exceeding 100 µm, or rounded, 10 µm to 35 µm in size. There are occasional compound granules having two or four components. The ovoid and pear-shaped granules have an eccentric hilum and the rounded granules acentric or slightly eccentric hilum. All granules show clearly visible concentric striations. Between crossed nicol prisms, the granules show a distinct black cross intersecting at the hilum.

B: Suspend 1 g of it in 50 mL of water, boil for 1 minute, and cool: a thin, cloudy mucilage is formed.

C: To 1 mL of the mucilage obtained in Identification test B, add 0.05 mL of iodine and potassium iodide TS: a dark blue color is produced, which disappears on heating.

Microbial limits (61)— The total aerobic microbial count does not exceed 1000 10³ per g, the total combined molds and yeasts count does not exceed 100 10² per g, and it meets the requirements of the test for the absence of Escherichia coli.

pH (791) — Prepare a slurry by weighing 5.0 g of Potato Starch, transferring to a suitable nonmetallic container, and adding 25.0 mL of freshly boiled and cooled water. Agitate continuously at a moderate rate for 1 minute. Stop the agitation, and allow to stand for 15 minutes. Determine the pH to the nearest 0.1 unit: the pH, determined potentiometrically, is between 5.0 and 8.0.
Loss on drying (731) — Dry about 1 g, accurately weighed, at 130° for 90 minutes: it loses not more than 20.0% of its weight.

Residue on ignition (281) : not more than 0.6%, determined on a 1.0-g test specimen. Ignition temperature 600 ± 50°.

Limit of iron— Shake 1.5 g of Potato Starch with 15 mL of 2 N hydrochloric acid, and filter. Transfer 10 mL of the filtrate to a test tube, add 2 mL of citric acid solution (2 in 10), 0.1 mL of thioglycolic acid, and mix. Add 10 N ammonium hydroxide until the solution is distinctly alkaline to litmus, dilute with water to 20 mL, and mix (Test Solution). Prepare a Standard Iron Solution containing the equivalent of 10 μg of iron per mL as directed under Iron (241). Immediately before use, quantitatively dilute an accurately measured volume of this solution with water to obtain a Diluted Standard Iron Solution containing the equivalent of 1 μg of iron per mL. Prepare the Standard Solution by transferring 10 mL of the Diluted Standard Iron Solution to a test tube and proceeding in the same manner as directed for the preparation of the Test Solution, beginning with “add 2 mL of citric acid solution (2 in 10).” After 5 minutes, any pink color in the Test Solution is not more intense than that in the Standard Solution, corresponding to a limit of 10 μg of iron per g.

Limit of oxidizing substances— Transfer 4.0 g to a glass-stoppered, 125-mL conical flask, and add 50.0 mL of water. Insert the stopper, and swirl for 5 minutes. Transfer to a glass-stoppered, 50-mL centrifuge tube, and centrifuge to clarify. Transfer 30.0 mL of the clear supernatant to a glass-stoppered, 125-mL conical flask. Add 1 mL of glacial acetic acid and 0.5 g to 1.0 g of potassium iodide. Insert the stopper, swirl, and allow to stand for 25 to 30 minutes in the dark. Add 1 mL of starch TS, and titrate with 0.002 N sodium thiosulfate VS to the disappearance of the starch-iodine color. Perform a blank determination, and make any necessary correction. Each mL of 0.002 N sodium thiosulfate is equivalent to 34 μg of oxidant, calculated as hydrogen peroxide. Not more than 1.4 mL of 0.002 N sodium thiosulfate is required (20 μg per g, calculated as H₂O₂).

Limit of sulfur dioxide: not more than 50 μg per g.

Reagents—

Carbon dioxide— Use carbon dioxide, with a flow regulator that will maintain a flow of 100 ± 10 mL per minute.

Bromophenol blue indicator solution— Dissolve 100 mg of bromophenol blue in 100 mL of dilute alcohol (1 in 5), and filter if necessary.

Hydrogen peroxide solution— Dilute 30% hydrogen peroxide with water to obtain a 3% solution. Just before use, add 3 drops of Bromophenol blue indicator solution, and neutralize to a violet-blue endpoint with 0.01 N sodium hydroxide. Do not exceed the endpoint.

Apparatus— In this test, the sulfur dioxide is released from the test specimen in a boiling acid medium and is removed by a stream of carbon dioxide. The separated gas is collected in a dilute hydrogen peroxide solution where the sulfur dioxide is oxidized to sulfuric acid and titrated with standard alkali. The apparatus consists essentially of a 500-mL three-neck, round-bottom boiling flask, a separatory funnel having a capacity of 100 mL or greater, a gas inlet tube of sufficient length to permit introduction of the carbon dioxide within 2.5 cm of the bottom of the boiling flask, a reflux condenser having a jacket length of 200 mm, and a delivery tube connecting the upper end of the reflux condenser to the bottom of a receiving test tube. Apply a thin film of stopcock grease to the sealing surfaces of all of the joints except the joint between the separatory funnel and the boiling flask, and clamp the joints to ensure tightness.

Procedure— Add 150 mL of water to the boiling flask. Close the stopcock of the separatory funnel, and begin the flow of carbon dioxide at a rate of 100 ± 5 mL per minute through the Apparatus. Start the condenser coolant flow. Add 10 mL of Hydrogen peroxide solution to a receiving test tube. After 15 minutes, without interrupting the flow of carbon dioxide, remove the separatory funnel from the boiling flask, and transfer 25.0 g of test specimen into the boiling flask with the aid of 100 mL of water. Apply stopcock grease to the outer joint of the
separatory funnel, and replace the separatory funnel in the boiling flask. Close the stopcock of the separatory funnel, and add 80 mL of 2 N hydrochloric acid to the separatory funnel. Open the stopcock of the separatory funnel to permit the hydrochloric acid solution to flow into the boiling flask, guarding against the escape of sulfur dioxide into the separatory funnel by closing the stopcock before the last few mL of hydrochloric acid drain out. Position the Apparatus in a water bath, and Boil the mixture for 1 hour. Remove the receiving test tube, and transfer its contents to a 200-mL wide-necked, conical flask. Rinse the receiving test tube with a small portion of water, add the rinsing to the 200-mL conical flask, and mix. Heat on a water bath for 15 minutes, and allow to cool. Add 0.1 mL of *Bromophenol blue indicator solution*, and titrate the contents with 0.1 N sodium hydroxide VS until the color changes from yellow to violet-blue, with the color change lasting for at least 20 seconds. Perform a blank determination, and make any necessary correction (see *Titrimetry* 541). Calculate the content, in µg per g, of sulfur dioxide in the test specimen taken by the formula:

\[
1000(32.03)VN/W,
\]

in which 32.03 is the milliequivalent weight of sulfur dioxide; \(V\) is the volume, in mL, of titrant consumed; \(N\) is the normality of the titrant; and \(W\) is the weight, in g, of test specimen taken.

**Organic volatile impurities,** Method IV (467) : meets the requirements.

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**Expert Committee :** (EMC) Excipients: Monograph Content

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