Draft Proposal for Comments and Inclusion in The Indian Pharmacopoeia

Lactulose Solution

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This draft proposal contains monograph text for inclusion in the Indian Pharmacopoeia (IP). The content of this draft document is not final, and the text may be subject to revisions before publication in the IP. This draft does not necessarily represent the decisions or the stated policy of the IP or Indian Pharmacopoeia Commission (IPC).

Manufacturers, regulatory authorities, health authorities, researchers, and other stakeholders are invited to provide their feedback and comments on this draft proposal. Manufacturers are also invited to submit samples of their products to the IPC to ensure that the proposed monograph adequately controls the quality of the product(s) they manufacture. Comments and samples received after the last date will not be considered by the IPC before finalizing the monograph.

Please send any comments you may have on this draft document to lab.ipc@gov.in, with a copy to Dr. Gaurav Pratap Singh (email: gpsingh.ipc@gov.in) before the last date for comments.

Document History and Schedule for the Adoption Process

Description	**Details**
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Further follow-up action as required.	

Lactulose Solution

Lactulose Solution is a solution in water prepared from Lactose Concentrate.

Lactulose Solution contains not less than 90.0 per cent and not more than 110.0 per cent of the stated amount of lactulose, $C_{12}H_{22}O_{11}$.

Usual strength. 10 g per 15 ml.

Identification

A. In the Assay, the principal peak in the chromatogram obtained with the test solution corresponds to the peak in the chromatogram obtained with reference solution (b).

B**.** Dilute 0.5 ml with 10 ml of *water*. Add 5 ml of hot *alkaline cupric-tartaric solution*. A red precipitate of cuprous oxide is formed.

Tests

pH (2.4.24). 2.5 to 6.5, measured after 15 minutes of contact with the electrodes.

Related substances. Determine by liquid chromatography (2.4.14).

Test solution. Dilute a quantity of the solution containing 2.0 g of Lactulose in 20 ml of *water*, add 25.0 ml of *acetonitrile* and allow the solution to reach at room temperature, dilute to 50.0 ml with *water*.

Reference solution (a). A solution containing 0.64 per cent w/v *galactose IPRS*, 0.48 per cent w/v *anhydrous lactose IPRS*, 0.32 per cent w/v of *epilactose IPRS*, 0.12 per cent w/v *tagatose IPRS* and 0.04 per cent w/v of *fructose IPRS* in a mixture of equal volumes of *acetonitrile* and *water*.

Reference solution (b). A solution containing 4.0 per cent w/v *lactulose IPRS*, 0.48 per cent w/v *anhydrous lactose IPRS* and 0.32 per cent w/v of *epilactose IPRS* in a mixture of equal volumes of *acetonitrile* and *water*.

Chromatographic system
- a stainless steel column 15 cm x 4.6 mm, packed with aminopropylsilane bonded to porous silica (3 µm), (Such as Hypersil APS-2),
- column temperature: 40°,
- mobile phase: a mixture of 18 volumes of a buffer solution prepared by dissolving 1.15 g of *sodium dihydrogen phosphate* in 1000 ml of *water* and 82 volumes of *acetonitrile*, *(Note-Adjust the concentration of acetonitrile between 78 per cent and 85 per cent to obtain appropriate retention times),*
- flow rate: 1.3 ml per minute,
- refractometer maintained at 40°.
- injection volume: 20 µl.

Name	Relative retention time
Tagatose	0.30
Fructose	0.34
Galactose	0.47
Epilactose	0.90
Lactulose	1.00
Lactose	1.17

Inject reference solution (b). The test is not valid unless the resolution between the peaks due to lactulose and lactose is not less than 1.5, between the peaks due to lactulose and epilactose is not less than 0.9 and the relative standard deviation for replicate injections is not more than 2.0 per cent for lactulose peak

Inject reference solution (a) and the test solution. In the chromatogram obtained with the test solution, the area of any peak corresponding to tagatose is not more than 1.33 times the area of the corresponding peak in the chromatogram obtained with reference solution (a) (4.0 per cent), the area of any peak corresponding to fructose is not more than the area of the corresponding peak in the chromatogram obtained with reference solution (a) (1.0 per cent), the area of any peak corresponding to galactose is not more than the area of the corresponding peak in the chromatogram obtained with reference solution (a) (16.0 per cent), the area of any peak corresponding to epilactose is not more than the area of the corresponding peak in the chromatogram obtained with reference solution (a) (8.0 per cent) and the area of any peak corresponding to lactose is not more than the area of the corresponding peak in the chromatogram obtained with reference solution (a) (12.0 per cent).

Other tests. Comply with the tests stated under Oral Liquids.

Assay. Determine by liquid chromatography (2.4.14), as described under Related substances.

Injection reference solution (b) and the test solution.

Determine the weight per ml (2.4.29) and calculate the content of $C_{12}H_{22}O_{11}$ in the solution.

Microbial contamination (2.2.9). Total microbial count is not more than 10^2 CFU per g of lactulose. 1 g is free from *Escherichia coli* and 10 g is free from *Salmonella*.

Storage. Store preferably at a temperature between 2° and 30°, avoid subfreezing temperatures.