Prussian Blue Insoluble and Magnesium Hydroxide Capsules

Published on: 08.10.2024 **Last date for comments:** 22.11.2024

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
Document version	1.0
Monograph proposed for inclusion	IP 2026
Tentative effective date of monograph	July, 2026
First draft published on IPC website for public comments	08.10.2024
Draft revision published on IPC website for public comments	-
Further follow-up action as required.	

Prussian Blue Insoluble and Magnesium Hydroxide Capsules

Prussian Blue Insoluble and Magnesium Hydroxide Capsules contains not less than 30.0 per cent of Fe, calculated on the dried basis and not less than 90.0 per cent and not more than 110.0 per cent of magnesium hydroxide, $Mg(OH)_2$.

Usual strength. Prussian Blue Insoluble 340 mg and Magnesium Hydroxide 500 mg.

Identification

A. Moisten 0.1 g of the mixed contents of capsules with 1 ml of *water* and add gradually while shaking 1 ml of *1 M sodium hydroxide*. A reddish-brown precipitate is formed within 10 minutes of incubation. Dry the precipitates at 105° for 60 minutes. Determine by infrared absorption spectrophotometry (2.4.6). Compare the spectrum with that obtained with *prussian blue IPRS* or with the reference spectrum of prussian blue.

B. To 0.1 g of the mixed contents of capsules in a test tube, add 10 ml of *2 M sodium hydroxide*. A reddish-brown precipitate is formed.

Tests

Disintegration (2.5.1). Not more than 30 minutes.

Cyanide. Not more than 400 µg per g of at pH 1 with 27 hours of dwelling time.

Buffer solution. Dissolve 12.8 of *dipotassium hydrogen orthophosphate* and 3.6 g of *potassium dihydrogen orthophosphate* in 1000 ml of *water*, adjusted to pH 7.5 with *dilute orthophosphoric acid* or *dilute sodium hydroxide solution.*

Pyridine barbituric acid reagent. Dissolve 6 g of *barbituric acid* in minimum volume of *water*, add 30 ml of *pyridine* and mix. Add 6 ml of *hydrochloric acid*, mix and cool to room temperature, dilute to 100 ml with *water.*

Solution A. Dissolve 410 g of *sodium acetate* in 500 ml of *water*, adjusted to pH 4.5 with *glacial acetic acid* and dilute to 100 ml with *water.*

Test solution. Weigh and transfer 1 g of mixed contents of 20 capsules to a 100-ml volumetric flask, add 50 ml of the buffer solution and incubate in a shaking water- bath at 37° with 75 shaker per minute for 24 hours, filter. Transfer 10.0 ml of the filtrate to 50-ml volumetric flask.

Reference solution. Dissolve 0.251 g of *potassium cyanide* in *water* and dilute to 100.0 ml with *water*. This solution contains 1 µg cyanide (CN) per ml.

Transfer 1.0 ml, 2.0 ml, 3.0 ml, 4.0 ml, 5.0 ml, 6.0 ml, 7.0 ml, 8.0 ml, 9.0 ml and 10.0 ml of the solution to separate 50-ml volumetric flask (contains cyanide (CN) from 0.02 to 0.2 µg per ml).

Blank solution. Pipette 10 ml of *water* in to a 50-ml volumetric flask.

Procedure. To each volumetric flask of the reference solution, test solution and blank solution, add 1.0 ml of solution A and 1.0 ml *chloramine-T* solution, mix. Add 5.0 ml of pyredine-barbituric acid reagent and dilute to volume with water. Stand for 10 minutes. Measure the absorbances of reference solution, test solution at 578 nm (2.4.7) using blank solution as compensation liquid.

Plot the reference solution curve on the abscissa and concentration of the cyanide on the ordinate.

Calculate the cyanide concentration as follows from slope and intercept of reference solution drawn.

$$CN \text{ (mg per liter)} = (\text{Slope} \times A_1 + \text{intercept}) \times 50/W \times 250/Y$$

Where,

A_1 = Absorbance of test solution,
W = Weight of the substance under examination,
Y = Volume of test solution taken for colourimetric.

Maximum Binding Capacity. Not less than 300 mg per g for Cs. Determine by atomic absorption spectrophotometry (2.4.2), measuring at 852.12 nm using caesium lamp.

Buffer solution. Dissolve 12.8 g of *dipotassium hydrogen orthophosphate* and 3.6 g of *potassium dihydrogen orthophosphate* in 1000 ml with *water,* adjusted to pH 7.5 with *dilute orthophosphoric acid* or dilute *sodium hydroxide* solution.

Reference solution (a) (Caesium (Cs) 1500 ppm). Dissolve 1.9005 g of *caesium chloride* in 1000.0 ml of the buffer solution.

Reference solutions (b) (Caesium (Cs) 600 ppm). Dilute 20.0 ml of reference solution (a) to 50.0 ml with the buffer solution.

Reference solutions (c) (Caseium (Cs) 750 ppm). Dilute 25.0 ml of reference solution (a) to 50.0 ml with the buffer solution.

Reference solutions (d) (Caesium (Cs) 900 ppm). Dilute 30.0 ml of reference solution (a) to 50.0 ml with the buffer solution.

Reference solutions (e) (Caesium (Cs) 1200 ppm). Dilute 40.0 ml of reference solution (a) to 10.0 ml with the buffer solution.

Procedure. Transfer 50.0 ml, each of, reference solution (a), reference solution (b), reference solution (c), reference solution (d) and reference solution (e) to five separate 250-ml volumetric flasks. Add one capsule to each of the volumetric flask. Incubate the mixture for 24 hours with constant shaking at 25°. After 24 hours, filter the solution and aspirate to AAS.

Measure caesium (Cs) concentrations in all the solutions using caesium lamp at 852.12 nm (2.4.2).

Calculate maximum binding capacity by Langmuir adsorption isotherm model. Ce and qe is calculated and a graph is plotted.

Where,

Ce (mg/liter) = Concentration of caesium (Cs) at equilibrium,
qe (mg/liter) = Amount of caesium (Cs) adsorbed at equilibrium,
qm (mg/g) = Maximum capacity of adsorbent,
KL (l/mg) = Constant related to energy of adsorption.

Plot the line between Ce/qe Vs Ce and from which the constants qm and KL are calculated.

Loss on drying (2.4.19). Not more than 10.0 per cent, determined on 1.0 g by drying in an oven at 105° for 60 minutes.

Assay.

For Iron-Determine by atomic absorption spectrophotometry (2.4.2), measuring at 248 nm using iron lamp.

Test solution. Weigh and transfer the mixed contents of 20 capsules containing 10 mg of Prussian blue to a 25-ml volumetric flask, add 10 ml of *1 M sodium hydroxide* and mix it with constant stirring followed by 10 minutes of incubation at room temperature, a reddish-brown precipitate is formed and allow for to sedimentation. After sedimentation of precipitates, the supernatant is collected in a measuring cylinder (solution A). Add 10 ml of *hydrochloric acid* to the sedimented precipitate and heat until a clear solution is obtained (solution B).

Reference solutions (a). Dissolved 7.022g of *ferrous ammonium sulphate* in 25 ml of *sulphuric acid* and dilute to 1000.0 ml with *water.*

Reference solutions (b). Dilute 0.2 ml of reference solution (a) to 100.0 ml with 2.5 per cent v/v solution of *nitric acid.*

Reference solutions (c). Dilute 0.4 ml of reference solution (a) to 100.0 ml with 2.5 per cent v/v solution of *nitric acid.*

Reference solutions (d). Dilute 0.6 ml of reference solution (a) to 100.0 ml with 2.5 per cent v/v solution of *nitric acid*.

Reference solutions (e). Dilute 0.8 ml of reference solution (a) to 100.0 ml with 2.5 per cent v/v solution of *nitric acid.*

Reference solutions (f). Dilute 1.0 ml of reference solution (a) to 100.0 ml with 2.5 per cent v/v solution of *nitric acid.*

Measure the absorbance of reference solution A and solution B at 248 nm using atomic absorption spectrophotometry (2.4.2).

Calculate the total iron content in the capsules by adding iron content in solution A and solution B.

For Magnesium Hydroxide- Weigh and transfer the mixed contents of 20 capsules containing about 0.5 g of Magnesium hydroxide to a 250-ml conical flask, add 50 ml of *0.5 M sulphuric acid*. Titrate with *1 M sodium hydroxide*, using methyl orange solution as indicator. Carry out a blank titration.

1 ml of *0.5 M sulphuric acid* is equivalent to 0.02916 g of $Mg(OH)_2$.

Storage. Store at a temperature not exceeding 30°.
