Edition: BP 2025 (Ph. Eur. 11.6 update)

Chlorhexidine Gluconate Dental Gel

General Notices

Chlorhexidine Gluconate Gel

Action and use

Antiseptic.

DEFINITION

Chlorhexidine Gluconate Dental Gel contains Chlorhexidine Gluconate Solution in a suitable water-miscible basis.

The gel complies with the requirements stated under Topical Semi-solid Preparations and with the following requirements.

Content of chlorhexidine gluconate, $C_{22}H_{30}Cl_2N_{10},2C_6H_{12}O_7$

90.0 to 105.0% of the stated amount.

IDENTIFICATION

In the Assay, record the UV spectrum of the principal peak in the chromatograms obtained with solutions (1) and (2) with a diode array detector in the range of 210 to 400 nm.

The UV spectrum of the principal peak in the chromatogram obtained with solution (1) is concordant with that of the peak in the chromatogram obtained with solution (2);

the retention time of the principal peak in the chromatogram obtained with solution (1) is similar to that of the peak in the chromatogram obtained with solution (2).

TESTS

Acidity or alkalinity

pH, 5.0 to 7.0, Appendix V L.

Related substances

Carry out the method for *liquid chromatography*, Appendix III D, using the following solutions.

(1) Dilute a quantity of the gel containing the equivalent of 10 mg of chlorhexidine gluconate to 50 mL with mobile phase A, stir and filter through a regenerated cellulose filter (Spartan 30 is suitable).
(2) Dilute 1 volume of solution (1) to 100 volumes with mobile phase A.
(3) Dilute 1 volume of a solution containing 0.1% w/v of *chloroaniline* (impurity P) in *acetonitrile (50%)* to 250 volumes with mobile phase A. Dilute 1 volume of this solution to 10 volumes with mobile phase A.

(4) Dilute 1 volume of a solution containing 0.2% w/v of *chlorhexidine impurity standard BPCRS* and 0.001% w/v of *chloroaniline* in *acetonitrile (50%)* to 10 volumes with mobile phase A.
(5) 0.02% w/v of *chlorhexidine for system suitability EPCRS* in mobile phase A.
(6) Dilute 1 volume of solution (2) to 10 volumes with mobile phase A.

CHROMATOGRAPHIC CONDITIONS

(a) Use a stainless steel column (25 cm × 4.6 mm) packed with *end-capped octadecylsilyl silica gel for chromatography* (5 µm) (Reprosil-Pur Basic C18 is suitable).
(b) Use gradient elution and the mobile phase described below.
(c) Use a flow rate of 1 mL per minute.
(d) Use a column temperature of 40°.
(e) Use a detection wavelength of 250 nm.
(f) Inject 25 µL of each solution.

MOBILE PHASE

Solvent A 10% v/v of *trifluoroacetic acid* in *acetonitrile*.

Mobile phase A 1.9 volumes of solvent A, 180 volumes of *acetonitrile* and 820 volumes of *water*.

Mobile phase B 0.2 volume of solvent A, 200 volumes of *water* and 800 volumes of *acetonitrile*.

Time (Minutes)	Mobile phase A (% v/v)	Mobile phase B (% v/v)	Comment
0-10	100	0	isocratic
10-14	100→85	0→15	linear gradient
14-43	85→75	15→25	linear gradient
43-54	75→0	25→100	linear gradient
54-60	0	100	isocratic
60-62	0→100	100→0	linear gradient
62-70	100	0	re-equilibration

SYSTEM SUITABILITY

The test is not valid unless:

in the chromatogram obtained with solution (4), the *resolution* between the peaks due to impurity 2 and impurity P is at least 1.5;

in the chromatogram obtained with solution (6), the *signal-to-noise ratio* for the peak due to chlorhexidine is at least 20.

CALCULATION OF IMPURITIES

For impurity P, use the concentration of chloroaniline in solution (3).

For each other impurity, use the concentration of chlorhexidine gluconate in solution (2).

For the reporting threshold, use the concentration of chlorhexidine gluconate in solution (6).

For peak identification, use solutions (3), (4) and (5).

Chlorhexidine retention time: about 26 minutes.

Relative retention: impurity 1, about 0.14; impurity G, about 0.30; impurity 2, about 0.33; impurity P, about 0.36; impurity N, about 0.5; impurity F, about 0.78; impurity A, about 0.79; impurity H, about 0.81; impurity O, about 0.9; impurity J, about 1.2; impurity K, about 1.3.

Correction factors: impurity 1, multiply by 0.5; impurity G, multiply by 1.3; impurity 2, multiply by 0.6; impurity N, multiply by 1.9, impurity F, multiply by 0.3; impurity A, multiply by 1.5; impurity O, multiply by 1.8; impurity J, multiply by 1.4.

LIMITS

— impurity N: not more than 2.0%;

— impurity H: not more than 1.0%;

— impurities J and K: not more than 0.7% of each;

— impurity G: not more than 0.6%;

— impurity F: not more than 0.5%;

— impurities A and O: not more than 0.4% of each;

— impurity P: not more than 0.2%;

— unspecified impurities: for each impurity, not more than 0.2%;

— total impurities, excluding impurity N: not more than 2.0%;

— reporting threshold: 0.1%.

ASSAY

Carry out the method for *liquid chromatography*, Appendix III D, using the following solutions.

(1) Dilute a quantity of the gel containing the equivalent of 10 mg of chlorhexidine gluconate to 50 mL with mobile phase A, stir and filter through a regenerated cellulose filter (Spartan 30 is suitable).
(2) 0.0144% w/v of *chlorhexidine acetate BPCRS* in mobile phase A.
(3) Dilute 1 volume of a solution containing 0.2% w/v of *chlorhexidine impurity standard BPCRS* and 0.001% w/v of *chloroaniline* in *acetonitrile (50%)* to 10 volumes with mobile phase A.

CHROMATOGRAPHIC CONDITIONS

The chromatographic conditions described under Related substances may be used.

SYSTEM SUITABILITY

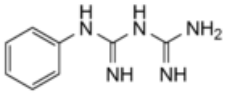
The test is not valid unless, in the chromatogram obtained with solution (3), the *resolution* between the peaks due to impurity 2 and impurity P is at least 1.5.

DETERMINATION OF CONTENT

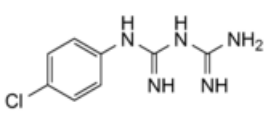
Calculate the content of $C_{22}H_{30}Cl_2N_{10},2C_6H_{12}O_7$ in the gel from the declared content of $C_{22}H_{30}Cl_2N_{10}$ in *chlorhexidine acetate BPCRS*. Each mg of $C_{22}H_{30}Cl_2N_{10}$ is equivalent to 1.776 mg of $C_{22}H_{30}Cl_2N_{10},2C_6H_{12}O_7$.

IMPURITIES

The impurities limited by the requirements of this monograph include impurities A, B, F, G, H, J, K, N, O and P listed under Chlorhexidine Gluconate Solution and:



1. 1-phenylbiguanidine;



2. 4-chlorophenyl biguanide.