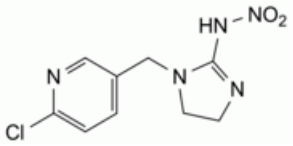
Edition: BP 2025 (Ph. Eur. 11.6 update)

Imidacloprid

General Notices

(Imidacloprid for Veterinary Use, Ph. Eur. monograph 2924)



$C_9H_{10}ClN_5O_2$ 255.7 *138261-41-3*

Ph Eur

DEFINITION

N-[1-[(6-Chloropyridin-3-yl)methyl]-4,5-dihydro-1*H*-imidazol-2-yl]nitramide.

Content

96.5 per cent to 102.0 per cent (dried substance).

CHARACTERS

Appearance

White or almost white, crystalline powder.

Solubility

Practically insoluble in water, sparingly soluble in methanol, practically insoluble in heptane.

It shows polymorphism (5.9).

IDENTIFICATION

Infrared absorption spectrophotometry (2.2.24).

Comparison *imidacloprid CRS*.

If the spectra obtained in the solid state show differences, dissolve the substance to be examined and the reference substance separately in *acetonitrile R*, evaporate to dryness and record new spectra using the residues.

TESTS

Related substances

Liquid chromatography (2.2.29). *Prepare the solutions immediately before use.*

Solution A Dissolve 7.5 g of *sodium hexanesulfonate R* in 900 mL of *water for chromatography R*, adjust to pH 2.5 with *phosphoric acid R* and dilute to 1000 mL with *water for chromatography R*.

Test solution (a) Dissolve 40.0 mg of the substance to be examined in 2 mL of *acetonitrile R* and dilute to 20.0 mL with solution A.

Test solution (b) Dilute 1.0 mL of test solution (a) to 10.0 mL with solution A.

Reference solution (a) Dissolve 40.0 mg of *imidacloprid CRS* in 2 mL of *acetonitrile R* and dilute to 20.0 mL with solution A. Dilute 1.0 mL of this solution to 10.0 mL with solution A.

Reference solution (b) Dilute 1.0 mL of test solution (b) to 50.0 mL with solution A.

Reference solution (c) Dissolve 10 mg of *imidacloprid for system suitability CRS* (containing impurities A, B and D) in 0.5 mL of *acetonitrile R* and dilute to 5 mL with solution A.

Column:

— *size*: *l* = 0.25 m, *Ø* = 4.6 mm;

— *stationary phase*: *end-capped octylsilyl silica gel for chromatography R* (5 µm);

— *temperature*: 40 °C.

Mobile phase:

— *mobile phase A*: solution A;

— *mobile phase B*: solution A, *acetonitrile R* (50:50 *V/V*);

Time (min)	Mobile phase A (per cent *V/V*)	Mobile phase B (per cent *V/V*)	Flow rate (mL/min)
0 - 3	90	10	1.0
3 - 9	90 → 80	10 → 20	1.0
9 - 9.5	80	20	1.5
9.5 - 15	80 → 55	20 → 45	1.5
15 - 21	55 → 40	45 → 60	1.5
21 - 28	40 → 0	60 → 100	1.5

Detection Spectrophotometer at 268 nm.

Autosampler Set at 25 °C.

Injection 10 µL of test solution (a) and reference solutions (b) and (c).

Identification of impurities Use the chromatogram supplied with *imidacloprid for system suitability CRS* and the chromatogram obtained with reference solution (c) to identify the peaks due to impurities A, B and D.

Relative retention With reference to imidacloprid (retention time = about 17 min): impurity A = about 0.19; impurity B = about 0.22; impurity D = 1.04.

System suitability Reference solution (c):

— *peak-to-valley ratio*: minimum 3.0, where H_p = height above the baseline of the peak due to impurity D and H_v = height above the baseline of the lowest point of the curve separating this peak from the peak due to imidacloprid.

Calculation of percentage contents:

— *correction factors*: multiply the peak areas of the following impurities by the corresponding correction factor: impurity A = 0.5; impurity B = 0.4.

— for each impurity, use the concentration of imidacloprid in reference solution (b).

Limits:

— *impurity A*: maximum 0.7 per cent;

— *impurity B*: maximum 0.25 per cent;

— *unspecified impurities*: for each impurity, maximum 0.20 per cent;

— *total*: maximum 1.5 per cent;

— *reporting threshold*: 0.10 per cent.

Chlorides

Maximum 0.5 per cent.

Dissolve 0.500 g in 30 mL of *acetone R*. Add 20 mL of *water R* and 2 mL of *dilute nitric acid R*.

Titrate with *0.1 M silver nitrate*, determining the end-point potentiometrically (*2.2.20*).

1 mL of *0.1 M silver nitrate* is equivalent to 3.545 mg of Cl.

Loss on drying (*2.2.32*)

Maximum 1.0 per cent, determined on 1.000 g by drying in an oven at 105 °C.

ASSAY

Liquid chromatography (*2.2.29*) as described in the test for related substances with the following modification.

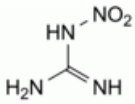
Injection 10 µL of test solution (b) and reference solution (a).

Calculate the percentage content of $C_9H_{10}ClN_5O_2$ taking into account the assigned content of *imidacloprid CRS*.

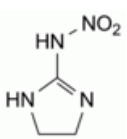
IMPURITIES

Specified impurities *A, B.*

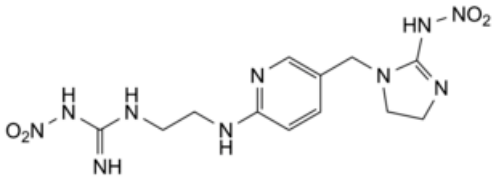
Other detectable impurities (the following substances would, if present at a sufficient level, be detected by one or other of the tests in the monograph. They are limited by the general acceptance criterion for other/unspecified impurities and/or by the general monograph Substances for pharmaceutical use (2034). It is therefore not necessary to identify these impurities for demonstration of compliance. See also 5.10. Control of impurities in substances for pharmaceutical use) *C, D, E, F, G.*



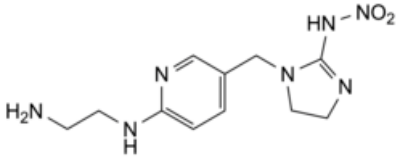
A. *N*-nitroguanidine,



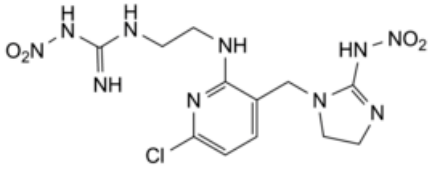
B. *N*-[4,5-dihydro-1*H*-imidazol-2-yl]nitramide,



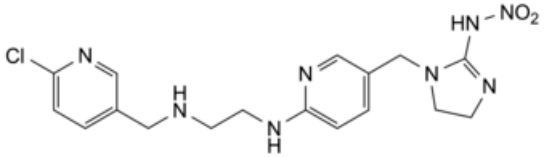
C. *N*-[2-[[5-[(2-nitroamido-4,5-dihydro-1*H*-imidazol-1-yl)methyl]pyridin-2-yl]amino]ethyl]-*N*′-nitroguanidine,



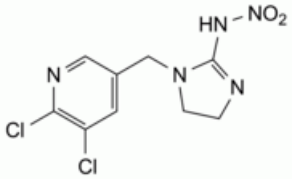
D. *N*-[1-[[6-[(2-aminoethyl)amino]pyridin-3-yl]methyl]-4,5-dihydro-1*H*-imidazol-2-yl]nitramide,



E. *N*-[2-[(6-chloro-3-[[2-nitroamido-4,5-dihydro-1*H*-imidazol-1-yl]methyl]pyridin-2-yl)amino]ethyl]-*N*′-nitroguanidine,



F. *N*-[1-[[6-[[2-[[(6-chloropyridin-3-yl)methyl]amino]ethyl]amino]pyridin-3-yl]methyl]-4,5-dihydro-1*H*-imidazol-2-yl]nitramide,



G. *N*-[1-[(5,6-dichloropyridin-3-yl)methyl]-4,5-dihydro-1*H*-imidazol-2-yl]nitramide.

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