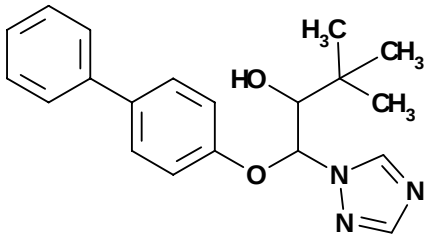
BITERTANOL

(1RS,2RS;1RS,2SR)-1-(biphenyl-4-yloxy)-3,3-dimethyl-1-(1*H*-1,2,4-triazol-1-yl)=
butan-2-ol

INFORMATION

COMMON NAME: bitertanol (ISO)

STRUCTURAL FORMULA:



EMPIRICAL FORMULA: $C_{20}H_{23}N_3O_2$

RMM: 337.4

CAS REGISTRY NUMBER: 55179-31-2

CIPAC CODE NUMBER: 386

CHEMICAL NAMES:

(1RS,2RS;1RS,2SR)-1-(biphenyl-4-yloxy)-3,3-dimethyl-1-(1*H*-1,2,4-triazol-1-yl)= butan-2-ol (IUPAC).

β-([1,1'-biphenyl]-4-yloxy)-α-(1,2-dimethylethyl)-1*H*-1,2,4-triazole-1-ethanol (CA).

BITERTANOL TECHNICAL

FAO Specification 386/TC/S/F(1998**)**

.1 DESCRIPTION

The material shall consist of bitertanol together with related manufacturing impurities and shall be a white to greyish or yellowish grained powder free from visible extraneous matter and added modifying agents.

.2 ACTIVE INGREDIENT

.2.1 Identity tests (386/TC/M/2, CIPAC J, p. 15)

An identity test is required if the identity of the active ingredient is in doubt.

.2.2 Bitertanol (386/TC/M/3, CIPAC J, p. 15)

The bitertanol content shall be declared (not less than 925 g/kg) and, when determined, the content obtained shall not differ from that declared by more than ± 25 g/kg.

.2.3 Ratio of isomers (286/TC/M/3, CIPAC J, p. 15)

Bitertanol is a mixture of diastereoisomers *RS* + *SR* and *RR* + *SS*. The ratio of the isomers shall be:

Diastereoisomer *RS* + *SR*, range: 70 to 85 %
(lower retention time in GLC method)

Diastereoisomer *RR* + *SS*, range: 15 to 30 %
(higher retention time in GLC method)

.3 IMPURITIES

.3.1 Water (MT 30.5, CIPAC J, p. 120)

Maximum: 5.0 g/kg

.3.2 Material insoluble in acetone (MT 27, CIPAC F, p.88)

Maximum: 5.0 g/kg

.4 PHYSICAL PROPERTIES

.4.1 Acidity (MT 31.1, CIPAC F, p.96)

Maximum acidity:	1.0 g/kg calculated as H_2SO_4
Maximum alkalinity:	1.0 g/kg calculated as NaOH

BITERTANOL WETTABLE POWDERS

FAO Specification 386/WP/S/F (1998)

.1 DESCRIPTION

The material shall consist of a homogeneous mixture of technical bitertanol, complying with the requirements of FAO specification 286/TC/S/F (1998), together with filler(s) and any other necessary formulants. It shall be in the form of a fine powder free from visible extraneous matter and hard lumps.

.2 ACTIVE INGREDIENT

.2.1 Identity tests (386/TC/M/2, CIPAC J, p. 15)

An identity test is required if the identity of the active ingredient is in doubt.

.2.2 Bitertanol (386/TC/M/3, CIPAC J, p. 15)

The bitertanol content shall be declared (g/kg) and, when determined, the content obtained shall not differ from that declared by more than the following amounts:

Declared content	Permitted tolerance
Above 100 up to 250 g/kg	± 6 % of the declared content
Above 250 up to 500 g/kg	± 5 % of the declared content

.3 IMPURITIES

Not relevant.

.4 PHYSICAL PROPERTIES

.4.1 pH range (MT 75.3, CIPAC J, p. 131)

pH range: 5.0 to 9.0

.4.2 Wet sieve test (MT 59.3, CIPAC F, p.179)

Maximum: 2 % retained on a 75 µm test sieve

.4.3 Suspensibility (MT 15.1, CIPAC F, p.45) (Notes 1 and 3)

A minimum of 90 % of the bitertanol content found under .2.2 shall be in suspension after 30 minutes in CIPAC standard water D at 30 ± 2°C (Notes 3 and 4).

Alternatively, if the buyer requires other CIPAC standard waters to be used, then this shall be specified when ordering.

.4.4 Persistent foam (MT 47.1, CIPAC F, p.152) (Note 5)

Maximum: 10 ml after 1 min

.4.5 Wettability (MT 53.3.1, CIPAC F, p.165)

The product shall be completely wetted in 3 min. without swirling.

.5 STORAGE STABILITY

.5.1 Stability at 54°C (MT 46.3.2, CIPAC I, to be published) (Note 6)

After storage at 54 ± 2°C for 14 days (Note 7), the determined average active ingredient content must not be lower than 97 % relative to the determined average content found before storage and the product shall continue to comply with .4.1, .4.2., 4.3. and 4.5

NOTES

1. The product should be tested at the highest and lowest rates of use recommended by the supplier, provided this does not exceed the conditions given in the method cited.

2. This test will normally only be carried out after the heat stability test .5.1.

3. Unless another water or temperature is specified.

4. Chemical assay is the only fully reliable method to measure the mass of active ingredient still in suspension. However, simpler methods such as gravimetric and solvent extraction determination may be used on a routine basis provided that these methods have been shown to give equal results to those of the chemical assay method. In case of dispute, the chemical method shall be the "Referee method".

5. The mass of sample to be used in the test should be at the highest rate of use recommended by the supplier.

6. *Analysis of the product before and after storage stability test, should be carried out at the same time (i.e. after storage) to reduce the analytical error.*

7. Unless other temperatures and/or times are specified.

BITERTANOL DISPERSIBLE CONCENTRATES

FAO Specification 386/DC/S/F (1998)

.1 DESCRIPTION

The material shall consist of a solution of technical bitertanol, complying with the requirements of FAO specification 286/TC/S/F (1998), in suitable solvents and with any other necessary added formulants. It shall be in the form of a stable liquid, free from visible suspended matter and sediment.

.2 ACTIVE INGREDIENT

.2.1 Identity tests (386/DC/M/2, CIPAC J, p. 15)

An identity test is required if the identity of the active ingredient is in doubt.

.2.2 Bitertanol (386/DC/M/3, CIPAC J, p. 15)

The bitertanol content shall be declared (g/kg or g/l at 20 ± 2 °C, Note 1) and, when determined, the content obtained shall not differ from that declared by more than the following amounts:

Declared content	Permitted tolerance
Above 100 up to 250 g/kg or g/l	± 6 % of the declared content
above 250 up to 500 g/kg or g/l	± 5 % of the declared content

.3 IMPURITIES

.3.1 Water (MT 30.5, CIPAC J, p. 120)

Maximum: 5.0 g/kg

.4 PHYSICAL PROPERTIES

.4.1 Acidity/Alkalinity (MT 31.1, CIPAC F, p.96)

Maximum acidity: 5.0 g/kg calculated as H_2SO_4
Maximum alkalinity: 1.0 g/kg calculated as NaOH

.4.2 Dispersion stability (MT 36.1, CIPAC F, p.108) (Notes 2 and 3)

The product, when diluted at 30 ± 2°C (Note 4) with CIPAC standard waters A and D, shall comply with the following:

Time after dilution	Limits of stability
0 h	Initial emulsification complete
1 h	maximum: 0.5 ml sediment

Alternatively, if the buyer requires other CIPAC standard waters to be used, then this shall be specified when ordering.

.4.3 Flash point (MT 12, CIPAC F, p.31) (Note 5)

The flash point of the product shall not be lower than the minimum declared flash point. A closed cup method shall be used and the method stated.

.5 STORAGE STABILITY

.5.1 Stability at 0°C (MT 39.1, CIPAC F, p.128)

After storage at 0 ± 2°C for 7 days, the volume of solid and/or liquid which separates shall not be more than 0.3 ml.

.5.2 Stability at 54°C (MT 46.3.1, CIPAC I, to be published) (Note 6)

After storage at 54 ± 2°C for 14 days (Note 7), the determined average active ingredient content must not be lower than 97 % relative to the determined average content found before storage and the product shall continue to comply with .4.2 and .4.3.

NOTES

1. If the buyer requires both g/kg and g/l at 20 °C then, in case of dispute, the analytical results shall be calculated as g/kg.

2. The concentration to be tested should be 1 % (1 ml of the DC added to 99 ml of water).

3. The emulsion turns very quickly to a suspension. Until now there is no proven methodology for testing the dispersion behaviour of a DC. Therefore CIPAC MT 36.1 is used for the preparation of the initial emulsion and the observation time is shortened as indicated.

4. Unless another temperature is specified.

5. Attention is drawn to the appropriate national and international regulations on handling and transport of flammable materials.

6. *Analysis of the product before and after storage should be carried out at the same time (i.e. after storage) to reduce the analytical error.*

7. *Unless other temperatures and/or times are specified.*

BITERTANOL AQUEOUS SUSPENSION CONCENTRATES

FAO Specification 386/SC/S/F (1998)

.1 DESCRIPTION

The material shall consist of a suspension of fine particles of technical bitertanol, complying with the requirements of FAO specification 286/TC/S/F (1998), in an aqueous phase together with suitable formulants. After gentle agitation the material shall be homogeneous (Note 1) and suitable for further dilution with water.

.2 ACTIVE INGREDIENT

.2.1 Identity tests (386/SC/M/2, CIPAC J, p. 15)

An identity test is required if the identity of the active ingredient is in doubt.

.2.2 Bitertanol (286/SC/M/3, CIPAC J, p. 15)

The bitertanol content shall be declared (g/kg or g/l at 20 ± 2 °C; Note 3) and, when determined, the content obtained shall not differ from that declared by more than the following amounts:

Declared content	Permitted tolerance
Above 250 up to 500 g/kg or g/l	± 5 % of the declared content
Above 500 g/kg or g/l	± 25 g/kg

.3 IMPURITIES

Not relevant.

.4 PHYSICAL PROPERTIES

.4.1 pH range (MT 75.3, CIPAC J, p. 131) pH range: 7.0 to 11.0

.4.2 Pourability (MT 148, CIPAC F, p.348) (Note 3)

Maximum "rinsed residue": 0.5 %

.4.3 Spontaneity of dispersion (MT 160, CIPAC F, p.391) (Note 4)

A minimum of 90 % of the bitertanol content found under .2.2 shall be in suspension after 5 min. in CIPAC standard water D at 30 ± 2°C (Notes 5 and 6). Alternatively, if the buyer requires other CIPAC standard waters to be used, then this shall be specified when ordering.

.4.4 Suspensibility (MT 161, CIPAC F, p.394) (Notes 4, 5 and 7)

A minimum of 90 % of the bitertanol content found under .2.2 shall be in suspension after 30 min in CIPAC standard water D at 30 ± 2 °C (Note6). Alternatively, if the buyer requires other CIPAC standard waters to be used, then this shall be specified when ordering.

.4.5 Wet sieve test (MT 59.3, CIPAC F, p.179)

Maximum: 1 % of the product shall be retained on a 75 µm test sieve

.4.6 Persistent foam (MT 47.2, CIPAC F, p.152)

Maximum: 25 ml after 1 min. (Note 8)

.5 STORAGE STABILITY

.5.1 Stability at 0°C (MT 39.3, CIPAC I,)

After storage at 0 ± 2°C for 7 days, the product shall continue to comply with .4.4, .4.5 and .4.6.

.5.2 Stability at 54°C (MT46.3.1, CIPAC I, to be published) (Notes 2 & 10)

After storage at 54 ± 2°C for 14 days (Note 10), the determined average active ingredient content must not be lower than 97 % relative to the determined average found before storage and the product shall continue to comply with .4.2, .4.3, .4.4, .4.5 and .4.6.

NOTES

1. *Before sampling to verify the product quality, inspect the commercial container carefully. On standing, suspension concentrates usually develop a concentration gradient from the top to the bottom of the container. This may even result in the appearance of a clear liquid on the top and/or of sediment on the bottom. Therefore before sampling, homogenise the product according to the instructions given by the manufacturer or, in the absence of such instructions, by gentle shaking of the commercial container (e.g. by inverting the closed container several times, large container must be opened and stirred adequately). After this procedure, the container should not contain a sticky layer of non-dispersed product at the bottom. A suitable and simple method of checking for a non-dispersed sticky layer ("cake") is by probing with a glass rod or any similar device adapted to the size and shape of the container. All the physical and chemical tests must be carried out on a laboratory sample taken after the recommended homogenisation procedure.*

2. *Unless homogenisation is carried out carefully, it is possible for the sample to become aerated. This can lead to errors in the determination of the density and in the calculation of the active ingredient content in g/l, if methods other than MT 3.3, CIPAC 1C, p.2249, are used. If the buyer requires both g/kg and g/l at 20 ± 2°C, then in case of dispute, the analytical results shall be calculated as g/kg.*

3. *This test is to ensure that the user can make use of the maximum amount of the product in the container. Suspension concentrates are fairly viscous pro-ducts. The test determines the ease with which the formulation pours out of the container and how easily it rinses out. The rinsed residue figures are of primary importance. At present, a better test to evaluate the amount of product remaining in the container is the "rinsability test".*

4. *This test will normally only be carried out after the heat stability test.*

5. *Chemical assay is the only fully reliable method to measure the mass of active ingredient still in suspension. However, simpler methods such as gravimetric and solvent extraction determination may be used on a routine basis provided that these methods have been shown to give equal results to those of the chemical assay method. In case of dispute, the chemical method shall be the 'Referee method'.*

6. *Unless another temperature is specified.*

7. *Recommended concentrations given on the label will refer to volumes of product.*

8. *The amount of sample to be used in the test should be specified at the highest rate of use recommended by the supplier.*

9. *Analysis of the product before and after storage stability test should be carried out at the same time (i.e. after storage) to reduce the analytical error.*

10. *Unless other temperatures and/or times are specified.*