TENTATIVE
FAO SPECIFICATIONS
FOR PLANT PROTECTION PRODUCTS

CARBETAMIDE

( R )-1-(ethylcarbamoyl) ethyl phenylcarbamate

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 1988
Group on Pesticide Specifications

FAO Panel of Experts on Pesticide Specifications, Registration Requirements and Application Standards

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¹ This disclaimer applies to all specifications published by FAO.
INTRODUCTION TO FAO SPECIFICATIONS
DEVELOPED UNDER THE OLD PROCEDURE


This manual contained detailed definitions and other essential background information on basic procedures and technical principles adopted by the group on Pesticide Specifications of the FAO Panel of Experts on Pesticide Specifications, Registration Requirements, Application Standards and Prior Informed Consent, such as:


   FAO (full) specifications (Code "S"). Specifications that have all necessary requirements together with CIPAC (full) methods, or other collaboratively studied (proven) methods. 2/ and 3/.

   FAO Provisional specifications [Code (S)] are those for which more evidence of the necessary parameters is available and where some collaborative study of the methods of analysis has been carried out.

   FAO Tentative specifications (Code "ts") are those which have been recommended by FAO as preliminary specifications which are based on minimum requirements. The methods of analysis cited are normally supplied by the manufacturer or may already have been published or be the subject of collaborative work.

Wherever possible, standards for apparatus and common names for pesticides are those approved by the International Standards Organization (ISO).

2. Expression of Active Ingredient Content (page 18 of the Manual)

   - for solids, liquid technical materials, volatile liquids (of maximum boiling point 50°C) and viscous liquids (with minimum kinematic viscosity of $1 \times 10^{-3} \text{ m}^2 / \text{s at 20°C}$) the FAO Specification shall be based on g/ kg expression of content;
- for all other liquids the active ingredient content of the product shall be declared in terms of g/kg or g/l at 20°C. 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.

3. Tolerance on Content (page 19 of the Manual).

A declared content of active ingredient must be included in all specifications, and one of the problems immediately arising is the level of tolerance acceptable above the nominal figures. The tolerance is influenced by (a) the reproducibility of the method of analysis, (b) the sampling error and (c) the manufacturing variance.

Allowable variations in analytical results (i.e., tolerances in content of active ingredient) with respect to specific pesticide consignments are intended to cover reasonable variations in content of active ingredient. For examples of such permitted tolerances, see the table on page 20 of the Manual.


Containers shall comply with pertinent national and international transport and safety regulations.

- **Technical material, dustable powders and granules**

  Containers shall be suitable, clean, dry and as specified, and shall not adversely affect, or be affected by, the product/material, but shall adequately protect it against external conditions.

- **Wettable Powders**

  The product shall be packed in suitable, clean, dry containers as specified in the order. The container shall provide all necessary protection against compaction, atmospheric moisture, oxidation, loss by vaporization and/or contamination to ensure that the product suffers no deterioration under normal transit and storage conditions.

  The product shall be protected by an adequate moisture barrier. This may be a suitable bag of polyethylene or alternative means of giving equal or better protection.

- **Solutions and emulsifiable concentrates**

  Containers shall be lined, where necessary, with a suitable material, or the interior surfaces treated to prevent corrosion and/or deterioration of the contents.

  Additional information should be given in all specifications where particular pesticides present problems in packaging.

- **Phytotoxicity**

No test can be specified to cover possible phytotoxicity of formulation to all crops. When a crop is not mentioned in the instructions for use, purchasers should check with the supplier that the material is suitable, always provided that such a use is not restricted or legally forbidden.

- **Wetting of crops**

The dilute spray should satisfactorily wet the leaves of the specified crops when used in accordance with the instructions. Test method MT 53.2, CIPAC 1, p. 965 may be useful.

1/ Should national pesticide specifications developed from these approved FAO specifications deviate from them, the national Authority responsible for making such changes is requested to inform the FAO Plant Protection Service of the nature of and the reasons for the modifications.

2/ Methods or analysis and miscellaneous techniques referred to in these specifications have been developed and adopted by CIPAC (Collaborative International Pesticides Analytical Council Ltd.). See CIPAC Handbooks, 1 (1970), 1A (1980), 1B t1983), 1C (1985) and ID (1988), CIPAC Proceedings 1980 and 1981, obtainable from Black Bear Press Limited, King's Hedges Road, Cambridge CB4 2PQ, England. The page numbers of specific methods are given in brackets in the specifications. A copy of a method not yet published can be obtained from the FAO Plant Protection Service.

3/ Information on standard waters for laboratory evaluation of pesticidal formulations will be found in "CIPAC Monograph 1, Standard Waters and an FAO survey on Naturally Occurring Waters" (1972). Black Bear Press Limited, King's Hedges Road, Cambridge CB4 2PO, England.
SUBMISSION OF DRAFT SPECIFICATIONS TO FAO

Any organization, commercial firm or interested individual is encouraged to submit relevant specifications, or proposals for revision of existing specifications, for pesticide products for consideration and possible adoption by FAO. Correspondence should be addressed to the Pesticide Management Group, Plant Production and Protection Division, FAO, Via delle Terme di Caracalla, 00153, Rome, Italy.


Specifications which are considered suitable for further processing are assigned priorities and circulated to appropriate organizations and specialists to comment. Comments, together with other relevant information, are then reviewed in detail by the Group on Specifications of the FAO Panel of Experts on Pesticide Specifications, Registration Requirements, Application Standards and Prior Informed Consent. The drafts are converted into FAO Provisional Specifications, or full FAO Specifications.
INFORMATION

COMMON NAME: Carbetamide (ISO)

EMPirical FORMula: C₁₂H₁₆N₂O₃

RMM: 236.3

CAS REGISTRY NUMBER: 16118-49-3

CIPAC CODE NUMBER: 95

CHEMICAL NAMES:

( R )-1-(ethylcarbamoyl) ethyl phenylcarbamate (IUPAC)
( R )-1-(ethylcarbamoyl) ethyl carbanilate (IUPAC)
( R )-N-ethyl-2-[(phenylamino) carbonyl] oxy] propanamide (CA)
N-ethyl-2-[(phenylcarbamoyl] oxy] propanamide
.1 DESCRIPTION

The material shall consist of carbetamide together with related manufacturing impurities and shall be a white to slightly yellow crystalline material free from visible extraneous matter and added modifying agents.

.2 ACTIVE INGREDIENT

.2.1 Identity Tests (CIPAC E, p. 29)

Where the identity of the material is in doubt, then it shall comply with at least one additional test.

.2.2 Carbetamide (CIPAC E, p. 29)

The carbetamide content shall be declared (minimum declared 950 g/kg) and when determined, the content obtained shall not differ from that declared by more than +/-20 g.

.3 IMPURITIES

.3.1 Water and volatile impurities (MT 17.2, CIPAC 1, p. 872)

Maximum: 10 g/kg

.3.2 Acetone insolubles (MT 27, CIPAC 1, p. 894)

Maximum: 5 g/kg

.4 PHYSICAL PROPERTIES

.4.1 Acidity or alkalinity (MT 31.1.1, CIPAC 1, p. 903) or MT 31.2.1, P. 905)

Minimum acidity: 1 g/kg calculated H2SO4
Maximum alkalinity: 1 g/kg calculated as NaOH

.4.2 Optical rotation (CIPAC E, p. 29)

\[ [\alpha] = -19 \text{ to } 23 \, ^\circ \text{C} \]
CARBETAMIDE WETTABLE POWDERS

.1 DESCRIPTION

The material shall consist of a homogeneous mixture of technical carbetamide [complying with the requirements of FAO Specification 95/TC/S (1988)] together with filler(s) and any other necessary formulators. 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 (CIPAC E, p. 29)

Where the identity of the active ingredient is in doubt, then the isolated active ingredient shall comply with at least one additional test.

.2.2 Carbetamide (CIPAC E, p. 32)

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

<table>
<thead>
<tr>
<th>Declared Content</th>
<th>Permitted Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 250 g/kg</td>
<td>±6% of the declared content</td>
</tr>
<tr>
<td>above 250 g/kg to 500 g/kg</td>
<td>±5% of the declared content</td>
</tr>
<tr>
<td>above 500 g/kg</td>
<td>±25 g</td>
</tr>
</tbody>
</table>

.3 PHYSICAL PROPERTIES

.3.1 pH of 1% aqueous dispersion (MT 75.2, CIPAC 1A, p. 1590)

Minimum: 9.0
Maximum: 10.5

.3.2 Wet sieve test (MT 59.3, CIPAC 1, p.981)

Maximum: 2% retained on a 75 µm test sieve.

.3.3 Suspensibility (CIPAC E, p. 29) (Notes 1 and 2)

A minimum of 60% of the carbetamide content found under .2.2 shall be in suspension after 30 minutes in CIPAC Standard Water C.

Alternatively, if the buyer requires other CIPAC Standard Waters to be used, then this shall be specified when ordering.
.3.4 Persistent foam [MT 47 CIPAC 1, P. 954] (Note 3)

Maximum: 25 ml after 1 min.

.3.5 Wetting of the product [MT 53.3.1, CIPAC 1, p. 967]

It shall be completely wetted in 1 min without swirling.

.4 STORAGE STABILITY

.4.1 Stability at 54°C [MT 46.1.1, CIPAC 1, p. 951]

After storage at 54 +/- 2°C for 14 days, the product shall continue to comply with .2.2, .3.1, .3.2 and .3.5.

NOTE 1. The product shall 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 MT 15.1, CIPAC 1, p. 861.

NOTE 2. This test will normally only be carried out after the heat stability test .4.1.

NOTE 3. The amount of sample to be used in the test should be specified.
CARBETAMIDE EMULSIFIABLE CONCENTRATES

.1 DESCRIPTION

The material shall consist of technical carbetamide [complying with the requirements of FAO tentative specification 95/TC/ts (1988)] dissolved in suitable solvents with other necessary formulants. It shall be in the form of a stable liquid free from visible suspended matter and sediment.

.2 ACTIVE INGREDIENTS

.2.1 Identity tests (CIPAC E, p. 29)

Where the identity of the active ingredient is in doubt, then the isolated active ingredient shall comply with at least one additional test.

.2.2 Carbetamide (CIPAC E, p. 29)

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

<table>
<thead>
<tr>
<th>Declared content</th>
<th>Permitted tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 250 g/l or g/kg</td>
<td>+/- 6% of the declared content</td>
</tr>
<tr>
<td>above 250 up to 500 g/l or g/kg</td>
<td>+/- 5% of the declared content</td>
</tr>
<tr>
<td>above 500 g/l or g/kg</td>
<td>+/- 25 g</td>
</tr>
</tbody>
</table>

.3 PHYSICAL PROPERTIES

.3.1 Acidity or alkalinity (MT 31.2.3, CIPAC 1, p. 904 or MT 31.2.3, p. 905)

Maximum acidity: 1 g/kg calculated as H2SO4
Maximum alkalinity: 1 g/kg calculated as NaOH.

.3.2 Emulsion stability and re-emulsification (MT 36.1.1, CIPAC 1, p. 910)

After the heat stability test (.4.2) the product when diluted at 30°C (Note 2) with CIPAC Standard Waters A and C, shall comply with the following:

<table>
<thead>
<tr>
<th>Time after dilution</th>
<th>Limits of stability</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 h</td>
<td>Initial emulsification: complete</td>
</tr>
<tr>
<td>0.5 h</td>
<td>Cream maximum: 2 ml</td>
</tr>
<tr>
<td>2.0 h</td>
<td>Cream maximum: 4 ml</td>
</tr>
<tr>
<td></td>
<td>Free oil: nil</td>
</tr>
</tbody>
</table>
24 h (note 3)  Re emulsification, complete
24.5 h (note 3)  Cream, maximum 4 ml
Free oil, 0.5 ml

In special cases, a test using CIPAC Standard Waters A and before the heat stability test may be necessary.

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

3.3 Flash point (MT 12, CIPAC 1, p. 846)

If required, 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 (note 4).

4 STORAGE STABILITY

4.1 Stability at 0°C (MT 39.1, CIPAC 1, p. 930)

After storage at 0 +/- 1°C for 7 days, the volume of solid and/or liquid which separates shall not be more than 0.3 ml.

4.2 Stability at 54°C (MT 46.1.3, CIPAC 1, p. 952)

After storage at 54 +/- 2°C for 14 days, the product shall continue to comply with .2.2, and .3.1

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

Note 2 Unless another temperature is specified.

Note 3 These tests need only be carried out in case of doubt as to the emulsion stability result of the 2-hour test.

Note 4 Attention is drawn to the appropriate national and international regulations on handling and transport of flammable materials.