भारतीय मानक **IS 14249 : 2024**

Indian Standard

ईटोफ़ेनप्रोक्स, तकनीकी — विशिष्टि

(पहला पुनरीक्षण)

Etofenprox, Technical — Specification

(First Revision)

ICS 65.100.10

भारतीय मानक ब्यूरो
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April 2024 **Price Group 4**

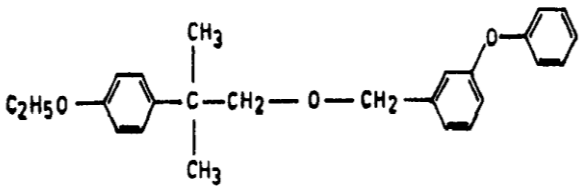
Pesticides Sectional Committee, FAD 01

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Pesticides Sectional Committee had been approved by the Food and Agriculture Division Council.

Etofenprox, technical is employed in the preparation of insecticidal formulations.

Etofenprox is the common name proposed by the International Organization for Standardization (ISO) for 3-phenoxybenzyl-2-(4-ethoxyphenyl)-2-methylpropylether, the empirical and structural formulae and molecular mass of etofenprox are given below:

Empirical formula	*Structural formula*	*Molecular mass*
$C_{25}H_{28}O_3$		376.47

This standard was first published in 1995. In this revision, the standard has been brought out in the latest style and format of the Indian Standards, and references to Indian Standards wherever applicable have been updated.

In the preparation of this standard due consideration has been given to the provisions of the *Insecticides Act,* 1968 and the rules framed thereunder and *Standards of Weights and Measures* (*Packaged Commodities*) *Rules,* 1977. However, this standard is subject to the restrictions imposed under these wherever applicable.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. This number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

ETOFENPROX, TECHNICAL — SPECIFICATION

(First Revision)

1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for etofenprox, technical.

2 REFERENCES

The standards given below contain provisions, which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard is encouraged to investigate the possibility of applying the most recent edition of these standards:

IS No.	*Title*
IS 1070 : 2023	Reagent grade water — Specification (*fourth revision*)
IS 6940 : 1982	Methods of test for pesticides and their formulations (*first revision*)
IS 8190 (Part 1) : 1988	Requirements for packing of pesticides: Part 1 Solid pesticides (*second revision*)
IS 10946 : 1996	Methods of sampling for technical grade pesticides (*first revision*)

3 REQUIREMENTS

3.1 Description

Etofenprox, technical shall be brownish white in colour and shall be free from extraneous impurities and added modifying agents. It shall be in the form of solid or semi-solid mass below 38 °C temperature.

3.2 The material shall comply with the requirements specified in Table 1.

4 PACKAGING

The material shall be packed in Grade 'A' M.S. containers suitably lacquered from inside and provided with pilfer proof closer system. The maximum capacity of the M.S. containers shall be 200 kg. It shall also conform to the general requirement given in IS 8190 (Part 1).

5 MARKING

5.1 The container shall bear legibly and indelibly the following information:

a) Name of the material;
b) Name and address of the manufacturer;
c) Batch number;
d) Date of manufacture;
e) Date of expiry;
f) Net quantity;
g) Nominal etofenprox content, percent (*m*/*m*);
h) Cautionary notice as worded in the *Insecticides Act*, 1968, and rules framed thereunder; and
j) Any other information required under the *Legal Metrology* (*Packaged Commodities*) *Rules*, 2011.

5.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

6 SAMPLING

Representative samples of the material shall be drawn according to the method prescribed in IS 10946.

7 TESTS

7.1 Tests shall be carried out as prescribed in col (4) of Table 1.

7.2 Quality of Reagents

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

Table 1 Requirements for Etofenprox, Technical

(*Clause* 3.2)

Sl No.	Characteristic	Requirements	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	Etofenprox content, percent by mass, *Min*	96.3	Annex A
ii)	Moisture content, percent by mass, *Max*	0.2	IS 6940
iii)	Material insoluble in acetone, percent by mass, *Max*	0.5	IS 6940
iv)	Acidity (as H_2SO_4), percent by mass, *Max*	0.1	IS 6940

ANNEX A

[*Table 1, Sl No.* (i)]

DETERMINATION OF ETENFROX CONTENT

A-1 GENERAL

Either of the two methods, namely, high performance liquid chromatography (HPLC) method (*see* A-2) or gas chromatography (GLC) method (*see* A-3) shall be used for determination of Etofenprox content. The HPLC method shall be the refree method.

A-2 HPLC METHOD

A-2.1 Principle

Etofenprox is dissolved in methanol along with internal standard and determined by HPLC on silica modified with C8 chain column with ultraviolet detector at 275 nm.

A-2.2 REAGENTS

A-2.2.1 *Etofenprox Reference Standard* — of known purity

A-2.2.2 *Internal Standard* — dihexylphthalate (AR grade)

A-2.2.3 *Methanol* — HPLC grade

A-2.2.4 *Water* — triple distilled

A-2.3 Apparatus

A-2.3.1 *High Performance Liquid Chromatograph*

Equipped with a tunable wavelength UV detector and an integrator and recorder. The suggestive parameters are given below and these can be varied provided standardization is done:

Column		Zorbax-7 C8 or equivalent 250 mm × 4.6 mm i.d.; stainless steel preferably with pre column
Mobile phase		Methanol : water (85 : 15) (*v/v*)
Detector		Ultra-violet (275 nm)
Flow Rate		1.2 ml/min
Retention time	Dihexylphthalate	11.5 min
	Etofenprox	19.0 min

A-2.3.2 Micro Syringe — 10 µl

A-2.4 PROCEDURE

A-2.4.1 *Preparation of Mobile Phase*

Mix 850 ml methanol and 150 ml of triple distilled water, degas before use.

A-2.4.2 *Preparation of Internal Standard Solution*

Weigh about 2 g of dihexylphthalate into a 100 ml volumetric flask and make up the volume to the mark with methanol and mix well.

A-2.4.3 *Preparation of Reference Standard Solution*

Weigh a quantity of the reference standard so as to contain about 100 mg etofenprox into a 10 ml volumetric flask and add 5 ml internal standard solution. Make up the volume with methanol and mix well.

A-2.4.4 *Preparation of Sample Solution*

Weigh a quantity of sample so as to contain about 100 mg etofenprox into a 10 ml volumetric flask and add 5 ml internal standard solution. Make up the volume with methanol and mix well.

A-2.4.5 *Estimation*

Inject 1 µl to 2 µl of the reference standard solution into the high performance liquid chromatograph (HPLC) followed by the sample solution with the help of syringe and measure peak areas of standard and sample solutions. Compute the percentage of etofenprox content in the sample.

A-2.5 Calculation

Etofenprox content, percent by mass =

$$\frac{M_1 \times A_2 \times A_3 \times P}{M_2 \times A_1 \times A_4}$$

where

M_1 = mass, in g, of etofenprox in the reference standard solution;

A_2 = peak area of etofenprox in the sample solution;

A_3 = peak area of internal standard in the reference standard solution;

P = percent purity of etofenprox reference standard;
M_2 = mass, in g, of etofenprox in the sample taken for test;
A_1 = peak area of etofenprox reference standard solution; and
A_4 = peak area of internal standard in sample solution.

A-3 GLC METHOD

A-3.1 Principle

Etofenprox is dissolved in acetone along with internal standard and determined by GLC equipped with flame ionisation detector.

A-3.2 Reagents

A-3.2.1 *Etofenprox Standard* — of known purity

A-3.2.2 *Internal Standard* — dinaphthylether

A-3.2.3 *Acetone* — AR grade

A-3.3 Apparatus

A-3.3.1 *Gas Liquid Chromatograph*

Equipped with a flame ionisation detector and an integrator or recorder. The suggested operating conditions are:

Column		Glass packed with 3 percent silicone DC-11 on gas chrom Q 100 cm length × 3 mm internal diameter (i.d.).
Gas flow		Carrier gas (N_2) : 50 ml/min Fuel gas (H_2) : 50 ml/min Air : 450 ml/min approx
Temperature		Column oven : 230 °C Detector : 230 °C Injection port : 270 °C
Retention time	Dinaphthylether	3.4 min
	Etofenprox	7.0 min

A-3.3.2 *Micro Syringe* — 10 µl

A-3.4 Procedure

A-3.4.1 *Preparation of Internal Standard Solution*

Weigh about 800 mg of dinaphthyl ether into a 100 ml volumetric flask and make up the volume to the mark with acetone.

A-3.4.2 *Preparation of Reference Standard Solution*

Weigh a quantity of the reference standard to contain about 100 mg etofenprox into a 10 ml volumetric flask and add 5 ml internal standard solution. Make up the volume to the mark with acetone.

A-3.4.3 *Preparation of Sample Solution*

Weigh a quantity of sample to contain about 100 mg etofenprox in to a 10 ml volumetric flask and add 5 ml internal standard solution. Make up the volume to the mark with acetone.

A-3.4.4 *Estimation*

Inject 1 µl to 2 µl of the reference standard solution into the gas chromatograph followed by the sample solution with the help of syringe and measure peak areas of standard and sample solutions. Compute the percentage of etofenprox content in the sample.

Etofenprox content, percent by mass = $\frac{M_1 \times A_2 \times A_3 \times P}{M_2 \times A_1 \times A_4}$

where

M_1 = mass, in g, of etofenprox in the reference standard solution;
A_2 = peak area of etofenprox in the sample solution;
A_3 = peak area of internal standard in the reference standard solution;
P = percent purity of etofenprox reference standard;
M_2 = mass, in g, of etofenprox in the sample taken for test;
A_1 = peak area of etofenprox in reference standard solution; and
A_4 = peak area of internal standard in sample solution.

Bureau of Indian Standards

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

This Indian Standard has been developed from Doc No.: FAD 01 (23385).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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