

**भारतीय मानक**  
**Indian Standard**

**IS 17412 : 2020**

---

---

**ट्राईमेथाइल फोस्फाइट — तकनीकी श्रेणी**

**Trimethyl Phosphite —  
Technical Grade**

ICS 71.080.99

© BIS 2020



भारतीय मानक ब्यूरो  
BUREAU OF INDIAN STANDARDS  
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI-110002  
[www.bis.gov.in](http://www.bis.gov.in) [www.standardsbis.in](http://www.standardsbis.in)

July 2020

Price Group 3

Organic Chemicals, Alcohol and Allied Products Sectional Committee, PCD 09

## FOREWORD

This Indian standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Organic Chemicals, Alcohols and Allied Products Sectional Committee had been approved by the Petroleum, Coal and Related Product Division Council.

Trimethyl phosphite is an organophosphorus compound with the formula  $\text{P}(\text{OCH}_3)_3$ , often abbreviated  $\text{P}(\text{OMe})_3$ . This colourless liquid is used as a ligand in organometallic chemistry and as a reagent in organic synthesis.

This standard is being formulated based on the request received from Department of Chemicals and Petrochemicals, Ministry of Chemical and Fertilizer.

The composition of the Committee, responsible for the formulation of this standard is given at Annex C.

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 : 1960 'Rules for rounding off numerical values (*revised*)'. The 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

# TRIMETHYL PHOSPHITE — TECHNICAL GRADE

## 1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for trimethyl phosphite.

## 2 REFERENCES

No reference.

## 3 REQUIREMENTS

### 3.1 Description

The material shall be a clear, colourless liquid as tested visually.

3.2 The material shall also comply with the requirements prescribed in Table 1 when tested according to the methods prescribed in column 4 of Table 1.

## 4 PRECAUTIONS IN STORING AND HANDLING

### 4.1 Storage

As trimethyl phosphite is flammable, keep away from heat, sparks and flame. Store away from water and air. Incompatible with oxidizing agents, bases, metal salts, peroxides. Necessary safeguards against the risk arising from storage and handling of large volumes of flammable liquids shall be provided and all due precautions taken at all times to prevent accident by fire. It shall be stored in a cool place. Open flames and smoking shall not be allowed where it is stored or handled. Storage vessels shall be vented to suitable scrubber.

### 4.2 Handling

Do not handle until all safety precautions have been read and understood. Avoid contact with skin and eyes. Wear full face protection and gloves. Use only non-sparking tools. Keep container tightly closed. Store locked up.

## 5 PACKING AND MARKING

### 5.1 Packing

For commercial purpose the material shall be packed in clean and dry containers made of mild steel composite or HMHDPE drums of 210 lit capacity or Tanker / ISO tanks and shall be packed as agreed between the purchaser and the supplier. The sample can be packed

in glass bottle of 100 ml, HMHDPE containers of capacity 1 kg, 5 kg, 25 kg and 50 kg.

## 5.2 Marking

5.2.1 The containers shall be securely closed and shall bear legibly and indelibly the following information:

- Name and grade of the material;
- Indication of the source of manufacture;
- Net mass of the material;
- Lot or batch number, in code or otherwise;
- Manufacturing date; and
- Safety instructions on product label.

All the containers in which the material is stored or transported shall also be prominently and clearly marked with the legend

### 5.2.2 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 TEST METHOD

Test methods have been mentioned at column 4 of the Table 1.

**Table 1 Requirements for Trimethyl Phosphite**  
( Clauses 3.2, 6 and 10.1 )

| Sl No. | Description                                     | Requirements        | Test Method Ref. |
|--------|-------------------------------------------------|---------------------|------------------|
| (1)    | (2)                                             | (3)                 | (4)              |
| i)     | Trimethyl phosphite (TMP), <i>Min</i>           | 98.0 percent (a/a). | Annex-A          |
| ii)    | Dimethyl phosphite (DMHP), <i>Max</i> .         | 0.50 percent (a/a)  | Annex-A          |
| iii)   | Dimethyl Methyl Phosphonate (DMMP) <i>Max</i> . | 0.50 percent (a/a)  | Annex-A          |
| iv)    | Trimethyl phosphate (TMPO), <i>Max</i> .        | 0.50 percent (a/a)  | Annex-A          |
| v)     | Methanol, <i>Max</i> .                          | 0.50 percent (a/a)  | Annex-A          |
| vi)    | Refractive index at 25°C                        | 1.403 to 1.409      | Annex-B          |

## IS 17412 : 2020

### 7 SAMPLING

The procedure for sampling and the criteria for conformity of the material shall be as prescribed in Table 2.

**Table 2 for TMP Sampling**  
(Clauses 7 and 8.2)

| Name of Product     | Material Property | Packing Type                | No. Drums Selected                                                                                                    | Sample Quantity |
|---------------------|-------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------|-----------------|
| Trimethyl phosphite | Liquid            | Tanker/ ISO Tanks           | Samples are drawn from the top of the tanker/ISO tank using sampling tube and poured directly into the sample bottle. | 100 ml          |
|                     |                   | HM HDPE /MS composite drums | 10 Percent of the total drums                                                                                         | 100 ml          |

#### 7.1 General Requirements of Sampling

In drawing, preparing, storing and handling of the test samples, the following precautions shall be taken.

**7.1.1** Samples should neither be taken nor stored at a place exposed to such weather as would affect basic change in its characteristics.

**7.1.2** Protect the samples, the sampling device and the containers for samples from adventitious contamination.

**7.1.3** The sampling device shall be made of glass or a metal on which the material has no action and shall be cleaned and dried when used.

**7.1.4** The sample container should be clean, dry, leak proof and be made of the material which shall not react with the contents of the sample. Sample container must have inner plug as well as outer cap to eliminate contact of air.

**7.1.5** Once the container is opened, care shall be taken to avoid the risk of deterioration of contents due to the presence of various factors, such as air, light moisture and temperature.

**7.1.6** Each sample container shall be sealed airtight after filling (there should not be space between material

and inner plug) and marked with full details of sample, such as date of manufacture, date of disposal, and other particulars of the consignment.

**7.1.7** The operator shall have safe access to and from the place where the sample is to be taken. He shall also have a safe working place with necessary light and ventilation.

**7.1.8** The operator engaged in sampling should have clean hands. It may be essential for the operator to wear clean gloves to safeguard against health or other hazards.

### 8 SAMPLING APPARATUS

#### 8.1 Sampling Tube

Open sampling tube (Fig. 1), should be made from borosilicate glass. It shall be of 20 to 40 mm diameter and 400 to 800 mm in length. The upper and lower ends are conical and of 5 to 10 mm diameter at the narrow end. For taking a sample, the sampling tube is first closed at the top with the thumb and lowered until the desired depth is reached. It is then opened for a short time to admit the material and finally closed and withdraw.

#### 8.2 Scale of Sampling

Number of drums to be chosen from a lot/batch shall depends on the size of the lot/batch and shall be according to Table 2. These drums shall be selected from the lot at random.

#### 8.3 Preparation of Test Sample

Mix thoroughly all the portions of material drawn from the drums. Out of these portions, a small but approximately equal quantity of material shall be taken from each selected drum and well mixed to form composite sample.

### 9 TESTS

Tests for trimethyl phosphite content and other impurities shall be conducted on composite samples.

#### 9.1 Criteria for Conformity

For declaring the conformity of a lot to the requirements of all characteristics tested on the composite sample, the test results shall satisfy the relevant requirements given in Table 1.

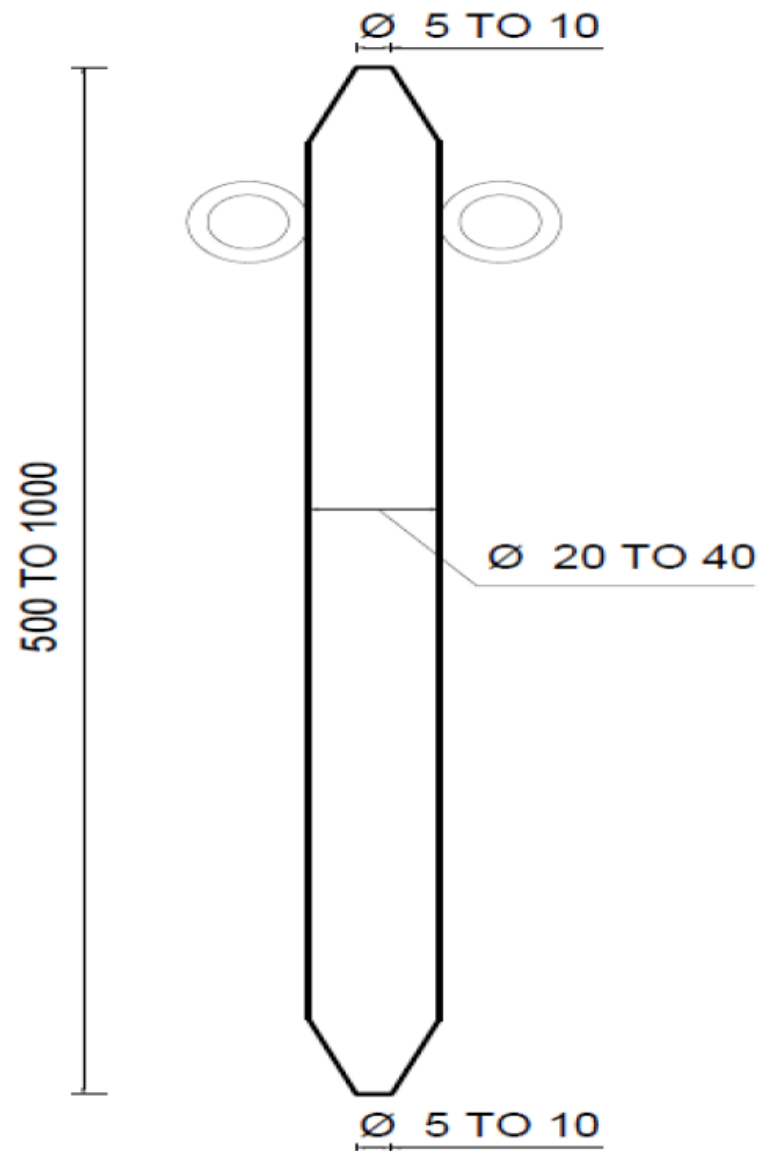


FIG.1 SAMPLING TUBE

IS 17412 : 2020

## ANNEX A

### DETERMINATION OF PURITY BY GC

( Table 1 )

#### A-1 GENERAL

This test method is applicable to determination of the purity of trimethyl phosphite by gas chromatography and certain known impurities.

#### A-2 APPARATUS

Any gas liquid chromatograph having flame ionization detector can be used with following operating condition.

#### A-3 CHROMATOGRAPHIC CONDITIONS

|                   |                                                                                                                                        |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Equipment         | : Gas chromatograph equipped with FID detector. Carrier gas helium.                                                                    |
| Column            | : Capillary column (5percent phenyl)-methylpolysiloxane, length: 25 m, ID: 0.32 mm, Film thickness: 1.05 µm (DB 5/ HP 5 or equivalent) |
| Injection volume  | : 0.2 µL                                                                                                                               |
| Carrier gas       | : Helium                                                                                                                               |
| Carrier flow      | : 1.9 mL/min                                                                                                                           |
| Initial oven temp | : 60°C                                                                                                                                 |
| Initial time      | : 2 min                                                                                                                                |
| Rate              | : 8°C/min                                                                                                                              |
| Final oven temp   | : 280°C                                                                                                                                |
| Final time        | : 2.5 min                                                                                                                              |
| Injector temp     | : 250°C                                                                                                                                |

Detector temp : 300°C

Report result : Area normalization

Run time : 32 min

NOTE — The above gas chromatographic conditions are suggestive. However, any GC having different columns (packed / capillary), different length / diameter / film thickness, and different carrier gas (He, H<sub>2</sub> or N<sub>2</sub>), with different calibration technique (internal standard, external standard, area normalization etc.) may be used, provided standardization / calibrations are done after setting up chromatographic conditions for required resolution.

#### A-4 PREPARATION OF SOLUTION

Inject the sample directly as no preparation is required.

| Type of Components                 | RT in Minutes | Relative to TMP |
|------------------------------------|---------------|-----------------|
| Methanol                           | 1.3 ± 0.5     | 0.31            |
| Trimethyl phosphite (TMP)          | 4.2 ± 0.5     | 1.00            |
| Dimethyl phosphite (DMHP)          | 5.4 ± 0.5     | 1.28            |
| Dimethyl methyl phosphonate (DMMP) | 7.2 ± 0.5     | 1.71            |
| Trimethyl phosphate (TMPO)         | 8.3 ± 0.5     | 1.97            |

## ANNEX B

### TEST METHOD FOR REFRACTIVE INDEX

( Table 1 )

**B-1** Refractive index is measured by digital refractometer and it is just the identity test. To achieve accuracy, the apparatus should be calibrated against distilled water which has refractive index of 1.3325 at 25°C.

**B-2** Cool the sample upto 25°C, put the drop on the lens and record the result. The temperature should be carefully adjusted and maintained since the refractive index varies significantly with temperature.

## ANNEX C

( Foreword )

### COMMITTEE COMPOSITION

Organic, Chemicals Alcohols and Allied Products Sectional Committee, PCD 09

| <i>Organization(s)</i>                                                         | <i>Representative(s)</i>                                           |
|--------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Chemical Engineering and Process Development<br>Division, NCL PUNE             | DR C. V. RODE ( <b>Chairman</b> )                                  |
| All India Distilleries Association (AIDA), New Delhi                           | SHRI V. N. RAINA                                                   |
| BASF India Limited, Mumbai                                                     | SHRI KIRAN BHAT<br>SHRI HEMAL BERAWALA ( <i>Alternate</i> )        |
| CDRI, Lucknow                                                                  | DR SANJEEV KANOJIYA                                                |
| Central Revenues Control Laboratory, Delhi                                     | DR T. A. SREENIVASA RAO                                            |
| Chemical and Petrochemicals Manufacturers<br>Association (CPMA), New Delhi     | SHRI KAMAL NANAVATY                                                |
| Deepak Fertilizer, Pune                                                        | DR SATISH CHAND SAINI<br>SHRI SURESH AMLE ( <i>Alternate</i> )     |
| Deepak Phenolics Limited, Bharuch                                              | DR S. SAMAL<br>SHRI N.R. SANDIPKUMAR PANCHIA ( <i>Alternate</i> )  |
| Dow-Corning India Limited, Mumbai                                              | SHRI ABRAHAM BARRETTO<br>SHRI RITESH GULABANI ( <i>Alternate</i> ) |
| Indian Chemical Council, Mumbai                                                | DR MRITUNJAY CHAUBEY<br>SHRI J. I. SEVAK ( <i>Alternate</i> )      |
| Jubilant Life Sciences Ltd, Noida                                              | SHRI HARI MOHAN LOHANI                                             |
| National Chemical Laboratory, Pune                                             | DR UDAYA KIRAN MARELLI                                             |
| UPL Limited, Mumbai                                                            | MR M. D. VACHHANI, GM (QA)                                         |
| Alkyl Amines Chemicals Ltd, Mumbai                                             | SHRI S. V. NIKUMBHE<br>SHRI SAMEER KATDARE ( <i>Alternate</i> )    |
| All India Alcohol-Based Industries Development<br>Association (AABIDA), Mumbai | SHRI K. L. RAPHAEL<br>SHRI KIRTI GAJJAR ( <i>Alternate</i> )       |
| Godavari Biorefineries Ltd, Mumbai                                             | SHRI SHANUL LAXMANRAO PAGAR<br>Ms WANI A. J ( <i>Alternate</i> )   |
| Gujarat Narmada Valley Fertilizers Company Limited,<br>Gujrat                  | DR M. J. KAPADIA<br>SHRI P. R. DESAI ( <i>Alternate</i> )          |
| Hindustan Organic Chemicals Ltd, (HOCL), Mumbai                                | SHRI DEEPEE KUMAR K<br>SHRI V. MOHAN ( <i>Alternate</i> )          |
| India Glycols Limited, Uttarakhand                                             | SHRI S. R. SONI<br>SHRI ALOK SINGHAL ( <i>Alternate</i> )          |
| Laxmi Organic Industries, Mumbai                                               | SHRI J. P. SURYAVANSHI<br>DR VIJAY S. MISHRA ( <i>Alternate</i> )  |
| Ministry of Chemicals & Fertilizers, New Delhi                                 | SHRI O. P. SHARMA<br>SHRI VARUN SINGH POONIA ( <i>Alternate</i> )  |
| National Test House, Ghaziabad                                                 | SHRI DEBASHIS SAHA<br>DR GOPAL KRISHAN ( <i>Alternate</i> )        |

**IS 17412 : 2020**

| <i>Organization(s)</i>          | <i>Representative(s)</i>                                                                                    |
|---------------------------------|-------------------------------------------------------------------------------------------------------------|
| Reliance India Limited, Mumbai  | SHRI K. K. SREERAMACHANDRAN<br>SHRI VASANT WARKE ( <i>Alternate</i> )                                       |
| BIS Director General, New Delhi | SHRI N. K. BANSAL, SCIENTIST 'F' AND HEAD (PCD),<br>[ REPRESENTING DIRECTOR GENERAL ( <i>Ex-Officio</i> ) ] |

*Member Secretary*  
SHRI CHANDRAKESH SINGH  
SCIENTIST 'D' (PCD), BIS



## Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 2016* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

### Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

### Review of Indian Standards

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 latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: PCD 09 (15488).

### Amendments Issued Since Publication

| Amend No. | Date of Issue | Text Affected |
|-----------|---------------|---------------|
|           |               |               |
|           |               |               |
|           |               |               |
|           |               |               |

## BUREAU OF INDIAN STANDARDS

### Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002  
Telephones: 2323 0131, 2323 3375, 2323 9402

Website: [www.bis.gov.in](http://www.bis.gov.in)

### Regional Offices:

Telephones

|          |                                                                        |                                                |
|----------|------------------------------------------------------------------------|------------------------------------------------|
| Central  | : Manak Bhavan, 9 Bahadur Shah Zafar Marg<br>NEW DELHI 110002          | { 2323 7617<br>2323 3841                       |
| Eastern  | : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi<br>KOLKATA 700054 | { 2337 8499, 2337 8561<br>2337 8626, 2337 9120 |
| Northern | : Plot No. 4-A, Sector 27-B, Madhya Marg<br>CHANDIGARH 160019          | { 265 0206<br>265 0290                         |
| Southern | : C.I.T. Campus, IV Cross Road, CHENNAI 600113                         | { 2254 1216, 2254 1442<br>2254 2519, 2254 2315 |
| Western  | : Manakalaya, E9 MIDC, Marol, Andheri (East)<br>MUMBAI 400093          | { 2832 9295, 2832 7858<br>2832 7891, 2832 7892 |

**Branches :** AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. COIMBATORE.  
DEHRADUN. DURGAPUR. FARIDABAD. GHAZIABAD. GUWAHATI.  
HYDERABAD. JAIPUR. JAMMU. JAMSHEDPUR. KOCHI. LUCKNOW.  
NAGPUR. PARWANOO. PATNA. PUNE. RAIPUR. RAJKOT. VISAKHAPATNAM.

Published by BIS, New Delhi