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***भारतीय मानक***

***Indian Standard***

**IS XXXX : 2024**

**प्लास्टिक के लिए**

**अल्ट्रामरीन नील— विशिष्टि**

**Ultramarine Blue For**

**Plastics — Specification**

ICS 83.080, 83.140.01

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भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDARDS

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**December 2024 Price Group X**

Plastics Sectional Committee, PCD 12

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Plastics Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

Plastic is a widespread medium for various applications, from children’s toys to kitchen tools. Colouring plastics can take on many different forms, and it’s vital to meet industry standards for safety and performance. A separate Indian standard has been published as IS 9833 : 2018 ‘List of colourants for use in plastics in contact with foodstuffs and pharmaceuticals (*second revision*)’ which lists colourants that can be safely used in contact with foodstuffs and pharmaceuticals. Plastic master batch segment holds the largest share of the Indian Ultramarine blue market. Master batches made out of Ultramarine blue are used in food packaging like water bottle, food crates, bottle caps, etc. and plastic materials that come in contact with food that we eat is not harmful to the humans.

This standard is intended to be used in the series of Indian Standards on paints, textiles, plastics for food contact applications. It is emphasized that these standards are used in combination to provide a system of control to the manufacturers of plastics. There is a need to ensure that lead and sulphur content in ultramarine blue is within the permissible limits that could reach the final product of mass consumption of Food contact plastics and Toys. Existence of Lead beyond the permissible limits will lead to a high toxicity risk.

The composition of the Committee, responsible for the formulation of this standard is given in Annex D.

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*)’. 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*

ULTRAMARINE BLUE FOR PLASTICS — SPECIFICATION

**1 SCOPE**

The standard specifies the requirements and methods of sampling and test for ultramarine blue for use in plastics that may be regarded as safe for use in contact with foodstuff and pharmaceuticals.

**2 REFERENCES**

The standards listed in Annex A contain provisions which, through reference in this text, constitute provisions 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 are encouraged to investigate the possibility of applying the most recent edition of the standards.

**3 TERMINOLOGY**

For the purpose of this standard the definitions in IS 2828 and the following shall apply.

**3.1 Colourants** — The generic term for all colouring substances.

NOTES

**1** Colourants comprise pigments (*see* **3.3**) which are insoluble in the medium as well as dyestuffs (*see* **3.2**) which are soluble in the medium.

**2** A pigment may contain in the pure chemical substance and/or a surface treatment and/or additives.

**3** A colourant may also contain traces of impurities, which may originate from raw materials and/or the production processes.

**4** In order to improve application properties, a colourant may contain additives.

**3.2 Dyestuff —** Colourants (*see* **3.1**) soluble in the application medium.

**3.3 Pigment** **—** Colourants (*see* **3.1**) consisting of particles, insoluble in the application medium (for example, coating material or plastic).

**3.4 Colourants** **Product** — It refers to commercially available colourants available in market. These commercially available products contain the component responsible for colour as well as quantities of other substances (generally referred to as additives) designed to improve the application properties of product, such as the dispensability, colouristic, flow and flocculation resistance of pigments. Dyestuffs often contains significant amount of diluents.

**4 REQUIREMENTS**

**4.1** Material shall be manufactured in compliance with good manufacturing practice so that under normal or foreseeable condition of use they do not transfer their constituents to foodstuff or pharmaceutical in quantities which could endanger human health; bring about an unacceptable change in the composition of the foodstuff or pharmaceutical or bring about a deterioration in the organoleptic characteristics thereof.

**4.2** When tested in accordance with IS 9845, colourants used shall not show visible bleeding or migration from the finished product and shall show no signs of instability or degradation during process. Colourants shall be sufficiently integrated within plastic material so as to preclude any visible migration into foodstuff or pharmaceutical under normal condition of use.

**4.3** Colourants used shall have a degree of purity. It shall also conform with the requirements given in Table 1 when tested in accordance with the methods given in col (4).

**4.4** Carbon black, if used, shall not be more than 2.5 percent (*m/m*). The UV absorbance of cyclohexane extract at 386 nm shall be less than 0.02 AU for 1 cm cell, or 0.01 AU for 5 cm cell.

**Table 1 Requirements of Ultramarine Blue**

(*Clause* 4.3)

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl No.** | **Characteristics** | **Requirements** | **Method of Test** |
| (1) | (2) | (3) | (4) |
|  | Colour | Shall closely match to that of the standard | **11** of IS 33 |
|  | Bulk density, g/cc | 0.4 to 0.6 | **17** of IS 33 |
|  | Volatile matter, percent by weight, *Max* | 1.0 | **8** of IS 33 |
|  | Residue on sieve, percent by weight, *Max* | 0.1 | **9** of IS 33 |
|  | Matter soluble in water, percent by weight, *Max* | 1.0 | **19** of IS 33 |
|  | Oil absorption, percent by weight | 30 to 40 | **10** of IS 33 |
|  | Relative tinting strength, percent | 100 ± 5 | **13** of IS 33 |
|  | Median particle diameter, D(0.5), µm, *Max* | 4.0 | IS 101 (Part 10/Sec 1) |
|  | Soluble organic colouring matter | To pass the test | Annex B |
|  | Alkalinity (as Na2CO3), percent by weight, *Max* | 0.1 | **20** of IS 33 |
|  | Free sulphur, percent by weight, *Max* | 0.02 | Annex C |
|  | Lead as Pb, percent by weight, *Max* | 0.002 | **15.1** of IS 1699 |
|  | Chlorides as NaCl, percent by weight, *Max* | 0.4 | **22.4** of IS 33 |
|  | Sulphates as Na2SO4, percent by weight, *Max* | 0.6 | **22.3** of IS 33 |

**5 PACKING AND MARKING**

**5.1 Packing**

The material shall be suitably packed as agreed to between the purchaser and supplier.

**5.2 Marking**

**5.2.1** The containers shall be marked with:

1. Name of the material;
2. Manufacturer’s name or trade mark, if any;
3. Weight of the material;
4. The lot and batch number; and
5. Any other statutory requirements.

**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 SAMPLING**

Representative sample of the material shall be drawn as prescribed under:

**6.1 General**

In drawing samples, the following precautions and directions shall be observed:

1. Sample shall not be taken in an exposed place;
2. The sampling apparatus shall be clean and dry;
3. Sample, the material being sampled, the sampling apparatus and container sample shall be protected from adventitious contamination;
4. A representative sample shall be drawn after the contents of each container selected for sampling are mixed thoroughly;
5. The sample shall be placed in clean, dry and air-tight metal or opaque glass container on which the material has no action;
6. The sample containers shall be of such a size that they are almost completely filled by the sample;
7. The sample containers shall be sealed air-tight after filling and marked with full details of sampling, the date of sampling and the month and year of manufacture of the material; and
8. Sample shall be stored in such a manner that the temperature of material does not vary unduly from the normal temperature.

**6.2 Sampling Apparatus**  
  
Sampling shall be carried out by means of a suitable sampling scoop of the type shown in Fig. 1. The scoop shall be made of metal and shall have a semi-circular (or C-shaped, if found suitable) cross-section.

**6.3 Scale of Sampling**

**6.3.1** *Lot*

In any consignment of one type of pigment or extender, all the packages of the same size and drawn from a single batch of manufacture shall constitute a lot. If a consignment of one type of pigment or extender is known to consist of different batches of manufacture or of different size of packages, then the packages of the same size and belonging to the same batch shall be grouped together and each such group shall constitute a separate lot.

**6.3.2** For ascertaining the conformity of the lot to the requirement of any specification, tests shall be carried out for each lot separately. The number of packages to be selected at random from various sizes of lots shall be in accordance with Table 2.

**6.3.3** The packages shall be selected at random and to ensure randomness of selection, the following procedure is recommended for use:

'Starting from any package in the lot, count them in any suitable order as 1, 2, 3 ... ... ... up to *r* and so on, where *r* is the integral part of *N*/*n* (*N* being the lot size, and *n* is the corresponding sample size given in Table 2). Every *r*th package thus counted shall be withdrawn to give sample for tests'.

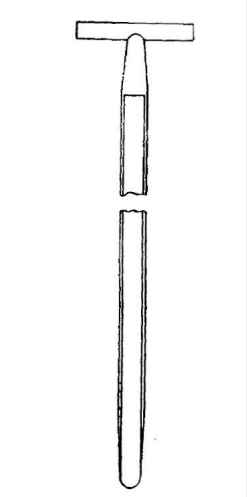
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Fig. 1 Sampling Scoop

**Table 2 Scale of Sampling**

(*Clauses* 6.3.2 *and* 6.3.3)

|  |  |  |
| --- | --- | --- |
| **Sl No.** | **Lot Size** | **Sample Size** |
| (1) | (2) | (3) |
|  | Up to 50 | 2 |
|  | 51 to 100 | 3 |
|  | 101 to 300 | 4 |
|  | 301 to 500 | 5 |
|  | 501 to 1 000 | 7 |
|  | 1 001 to 3 000 | 10 |
|  | 3 001 and above | 15 |

**6.4 Preparation of test samples**

**6.4.1** From each of the packages selected according to **6.3.3**, a small representative portion of the material shall be drawn with the help of the sample scoop by inserting it into the material at different depths. (The approximate quantity of material to be drawn from a package shall be not less than 500 g).

**6.4.2** Out of these portion a small but equal quantity of material shall be taken and thoroughly mixed to form a composite sample, sufficient for carrying out triplicate determination for all the characteristics, specified under **4.3**. If the quantities of material mixed from different portions is much larger, the process of coning and quartering may be adopted to obtain the requisite quantity (*see* Note). The composite sample shall be divided into three parts: one for the purchaser, another for the supplier and the third to be used as a referee sample.

NOTE — On a clean impervious surface, heap the sample into a cone by depositing separate small quantities, one on top of the other, ensuring that the apex always remains in the same vertical line. Break down the cone, mix and reform the cone twice in the same manner. Flatten the third cone by pressing with a metal or glass sheet so that the mass of uniform thickness and diameter is obtained and quarter along the two diameters. Discard the diagonally opposite quarters and heap remaining two quarters into a cone. Repeat this process until a sufficient quantity is left to provide sample of not less than 500 g.

**6.4.3** The three parts of the composite sample shall be transferred to separate containers. These containers shall be sealed air-tight and labelled with full identification particulars given in **6.1**(g).

**6.4.4** The reference test sample shall bear the seal of both the purchaser and the supplier. It shall be kept at a place agreed to between the purchaser and the supplier, and should be used in case of any dispute between the two.

**6.5 Number of Tests**

Test for determination of all the characteristics specified in the relevant material specification shall be conducted on the composite sample.

**6.6 Criteria of Conformity**

A lot shall be declared as conforming to the requirements of the specification if the characteristics tested on the composite sample satisfy the requirements given in the material specification.

**ANNEX A**

(*Clause* 2)

**LIST OF REFERRED STANDARDS**

|  |  |
| --- | --- |
| *IS No.* | *Title* |
| IS 33 : 1992 | Inorganic pigments and extenders for paints –– Methods of sampling and test (*third revision*) |
| IS 75 : 1973 | Specification for linseed oil, raw and refined (*second revision*) |
| IS 79 : 2021 | Specification for linseed stand oil for paints (*second revision*) |
| IS 101 (Part 10/Sec 1) : 2022 / ISO 13320 : 2020 | Methods of sampling and test for paints, varnishes and related products: Part 10 Instrumental analysis, Section 1 Particle size analysis — Laser diffraction methods (*first revision*) |
| IS 323 : 2009 | Rectified spirit for industrial use — Specification (*second revision*) |
| IS 460 (Part 2) : 2020 | Test sieves — Specification: Part 2 Perforated plate test sieves (*fourth revision*) |
| IS 1699 : 2024 | Food colours — Methods of sampling and test (*third revision*) |
| IS 1997 : 2008 / ISO 385 : 2005 | Laboratory glassware — Burettes (*third revision*) |
| IS 2316 : 1990 | Methods of preparation of standard solutions for colorimetric and volumetric analysis (*second revision*) |
| IS 2828 : 2019 / ISO 472 : 2013 | Plastics — Vocabulary (*second revision*) |
| IS 5296 : 2024 | Chloroform, pure and technical — Specification (*third revision*) |
| IS 9788 : 2023 | Titanium dioxide, rutile for paints — Specification (*first revision*) |
| IS 9845 : 1998 | Determination of overall migration of constituents of plastics materials and articles intended to come in contact with foodstuffs — Method of analysis (*second revision*) |
| IS 12305 : 2018 / ISO 4793 : 1980 | Laboratory sintered (fritted) filters –– Porosity grading, classification and designation (*first revision*) |

**ANNEX B**

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

**SOLUBLE ORGANIC COLOURING MATTER**

**B-1 GENERAL**

**B-1.1** **Outline of Method**

To a boiling solution of the material in ethanol, sodium hydroxide solution and acetic acid are added separately and examined for any development of colour.

**B-2****REAGENTS**

**B-2.1 Ethyl Alcohol** — 95 percent (*v/v*), conforming to IS 323

**B-2.2 Acetic Acid** — 10 percent (*v/v*)

**B-2.3 Sodium Hydroxide Solution —** approximately 4 N

**B-3 PROCEDURE**

**B-3.1** Add to ethyl alcohol in a beaker, a small quantity of the material and bring to boiling. Divide the boiling solution into parts and take in two test tube. To the test tubes, add a few ml of acetic acid and sodium hydroxide respectively. Observe the colour of the liquid in the test tube.

**B-4 RESULT**

**B-4.1** The material shall be deemed to have passed this test if the liquids remain colourless.

**ANNEX C**

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

**DETERMINATION OF FREE SULPHUR**

**C-1 GENERAL**

**C-1.1 Outline of Method**

The material is extracted with chloroform, as solvent in soxhlet apparatus, and the solvent evaporated from the extracted material. The amount of free sulphur is calculated from the residue left after evaporation.

**C-2 APPARATUS**

**C-2.1** **Soxhlet Apparatus**

**C-3 REAGENT**

**C-3.1** *Chloroform* — neutral and pure (*see* IS 5296)

**C-4 PROCEDURE**

**C-4.1** Weight accurately about 60 g of the material and extract with sufficient quantity of chloroform in a Soxhlet apparatus for about 60 h. Distil off the contents and evaporated the residue to dryness at 60 °C weight the residue obtained**.**

**C-5 CALCULATION**

Free sulphur, percent by weight = 100

where

*W*1 = weight in g of residue; and

*W*2 = weight in g of the material taken.

**ANNEX D**

(*Foreword*)

**COMMITTEE COMPOSITION**

Plastics Sectional Committee, PCD 12

| *Organization* | *Representative(s)* |
| --- | --- |
| [Central Institute of Petrochemicals Engineering and Technology (CIPET), Chennai](javascript:;) | Prof Shishir Sinha **(*Chairperson*)** |
| All India Plastics Manufacturers Association, Mumbai | Shri Jagat Killawala  Shri Shyam Sunder (*Alternate*) |
| Central Institute of Petrochemicals Engineering and Technology (CIPET), Chennai | Dr S. N. Yadav  Dr Smita Mohanty (*Alternate* I)  Dr Vishal Verma (*Alternate* II) |
| Central Pollution Control Board, New Delhi | Ms Divya Sinha  Ms Yogesh Chandra (*Alternate*) |
| Chemical and Petrochemicals Manufacturers Association, New Delhi | Shri Uday Chand |
| Coca-Cola India Private Limited, Gurugram | Shri Virendra Landge  Shri Rajendra Dobriyal (*Alternate*) |
| CSIR - Central Food Technological Research Institute, Mysore | Shri R. S. Matche  Shri Keshava Murthy. P (*Alternate*) |
| CSIR - Indian Institute of Toxicology Research, Lucknow | Dr V. P. Sharma  Dr A. B. Pant (*Alternate*) |
| Department of Chemicals and Petrochemicals, Government of India, New Delhi | Shri O. P. Sharma  Dr Sanjay Kumar Chattopadhyay (*Alternate*) |
| Food Corporation of India (FCI), New Delhi | Shri Kaushik Das  Shri S. Vijay Kumar (*Alternate*) |
| GAIL (India) Limited, New Delhi | Shri Kuldeep Negi  Shri Ajit Chaturvedi (*Alternate*) |
| Haldia Petrochemicals Limited, Kolkata | Shri Suvomoy Ganguly  Ms Amartya Maity (*Alternate* I)  Ms Sudipta Ghosh (*Alternate* II) |
| HPCL Mittal Energy Limited, Noida | Shri Vineet Kumar Gupta  Shri Alakesh Ghosh (*Alternate*) |
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| Indian Centre for Plastics in the Environment, Mumbai | Shri Tushar K. Bandopadhyay  Ms Neha Maurya (*Alternate* I)  Ms Poonam Gupta (*Alternate* II) |
| Indian Flexible Packaging & Folding Carton Manufacturers Association, Mumbai | Shri Atin Chaudhuri |
| Indian Institute of Technology Delhi, New Delhi | Prof J. Jacov  Prof Sampa Saha (*Alternate*) |
| Indian Institute of Technology Roorkee, Roorkee | Shri Prasenjit Mondel  Dr Pradip Kumar Maji (*Alternate* I)  Dr Komal Tripathi (*Alternate* II) |
| Indian Oil Corporation Limited, New Delhi | Shri Sumit Basu  Shri Raja Poddar (*Alternate* I)  Shri Jatinder Dhaliwal (*Alternate* II) |
| Indian Pharmacopoeia Commission, Ghaziabad | Dr Jai Prakash  Dr Manoj Kumar Pandey (*Alternate*) |
| Indian Plastic Institute, Mumbai | Shri V. B. Lall  Shri Mihir Banerji (*Alternate*) |
| Ministry of Environment Forest and Climate Change, New Delhi | Dr Satyendra Kumar  Shri Amit Love (*Alternate*) |
| National Chemical Laboratory, Pune | Dr P. R. Suresha  Dr R. V. Gundloori (*Alternate* I)  Ms Sangeeta Hambir (*Alternate* II) |
| Organisation of Plastics Processors of India, Mumbai | Shri Deepak Lawale |
| PlastIndia Foundation, Mumbai | Shri Hemant Minocha  Shri Raju D. Desai (*Alternate*) |
| Reliance Industries Limited, Mumbai | Shri S. V. Raju  Shri Amit Shah (*Alternate* I)  Dr Shreeram Wadekar (*Alternate* II) |
| Sabic Innovative Plastics India Private Limited, Bengaluru | Dr Sumanda Bandyopadhyay  Shri Nagaraj Dhadesugur (*Alternate* I)  Shri Sunil Rauto (*Alternate* I) |
| Shivalik Agro Poly Products Ltd., Mohali | Shri Pankaj Kumar Mahajan  Dr G. D. Tyagi (*Alternate*) |
| Shriram Institute for Industrial Research, Delhi | Dr Manmohan Kumar  Shri Sanjay Kumar Singh (*Alternate* I)  Ms Pushplata (*Alternate* II) |
| Technical Training and Research Centre, Lohia Group, Kanpur | Shri R. K. Dwivedi |
| Voluntary Organisation in Interest of Consumer Education (VOICE), New Delhi | Shri M. A. U. Khan  Dr Rajiv Jha (*Alternate*) |
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| *Member Secretary*  Shri Shivam Dwivedi  Scientist ‘C’/Deputy Director  (Petroleum, Coal And Related Products), BIS | |