भारतीय मानक **IS 1760 (Part 4) : 2024**

Indian Standard

चूना पत्थर, डोलोमाइट और सम्बद्ध सामग्री का रासायनिक विश्लेषण

भाग 4 कार्बन डाइऑक्साइड का निर्धारण

(दूसरा पुनरीक्षण)

Chemical Analysis of Limestone, Dolomite and Allied Materials

Part 4 Determination of Carbon Dioxide

(Second Revision)

ICS 73.080

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Methods of Chemical Analysis of Metals Sectional Committee, MTD 34

FOREWORD

This Indian Standard (Part 4) (Second Revision) was adopted by the Bureau of Indian Standards after the finalized by the Methods of Chemical Analysis of Metals Sectional Committee had been approved of the Metallurgical Engineering Division Council.

This standard was first published in 1962 and subsequently revised in 1991. This revision has been brought out to bring the standard in the latest style and format of the Indian Standards. It covers the determination of different elements in various grades of minerals like limestone, dolomite, calcite and magnesite. It also cover the method for magnesite refractories.

The part covers determination of carbon dioxide other parts are as follows:

Part 1	Loss on ignition
Part 2	Determination of silica
Part 3	Determination of iron oxide, alumina, calcium oxide and magnesium oxide
Part 5	Determination of chlorides
Part 6	Determination of free silica

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

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 same as that of the specified value in this standard.

Indian Standard

CHEMICAL ANALYSIS OF LIMESTONE, DOLOMITE AND ALLIED MATERIALS

PART 4 DETERMINATION OF CARBON DIOXIDE

(Second Revision)

1 SCOPE

This standard (Part 4) prescribes method for determination of carbon dioxide in the range from 42 percent to 52 percent in limestone, dolomite and allied materials.

2 REFERENCES

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

IS No.	*Title*
IS 266 : 2024	Sulphuric acid — Specification (*fourth revision*)
IS 1070 : 2023	Reagent grade water — Specification (*fourth revision*)
IS 2109 : 1982	Methods of sampling dolomite, limestone and other allied materials

3 SAMPLING

3.1 The sample shall be drawn and prepared in accordance with IS 2109.

3.2 Grind 5 g to 10 g of sample, as given in 3.1 so that it passes through IS Sieve 15 (100 mesh). Dry to a constant mass at 105 °C ± 2 °C and use it for the purpose of chemical analysis.

4 QUALITY OF REAGENTS

Unless specified otherwise, analytical grade reagents and distilled water (*see* IS 1070) shall be employed for the test.

5 DETERMINATION OF CARBON DIOXIDE

5.1 Outline of the Method

A known weight of the sample is made to react with an acid and the liberated carbon dioxide freed from impurities is absorbed in previously weighed soda asbestos bulbs and weighed. From the difference in weight, the percentage of carbon dioxide is calculated.

5.2 Apparatus

The assembly of apparatus is shown in Fig. 1. In order to obtain better pressure for drawing gases through the train, all joints should be mercury sealed.

5.3 Reagents

5.3.1 *Dilute Hydrochloric Acid* — 1 : 1 (*v/v*)

5.3.2 *Concentrated Sulphuric Acid* — relative density = 1.84 (conforming to IS 266)

5.3.3 *Ascarite or Soda Asbestos*

5.3.4 *Magnesium Perchlorate* — solid

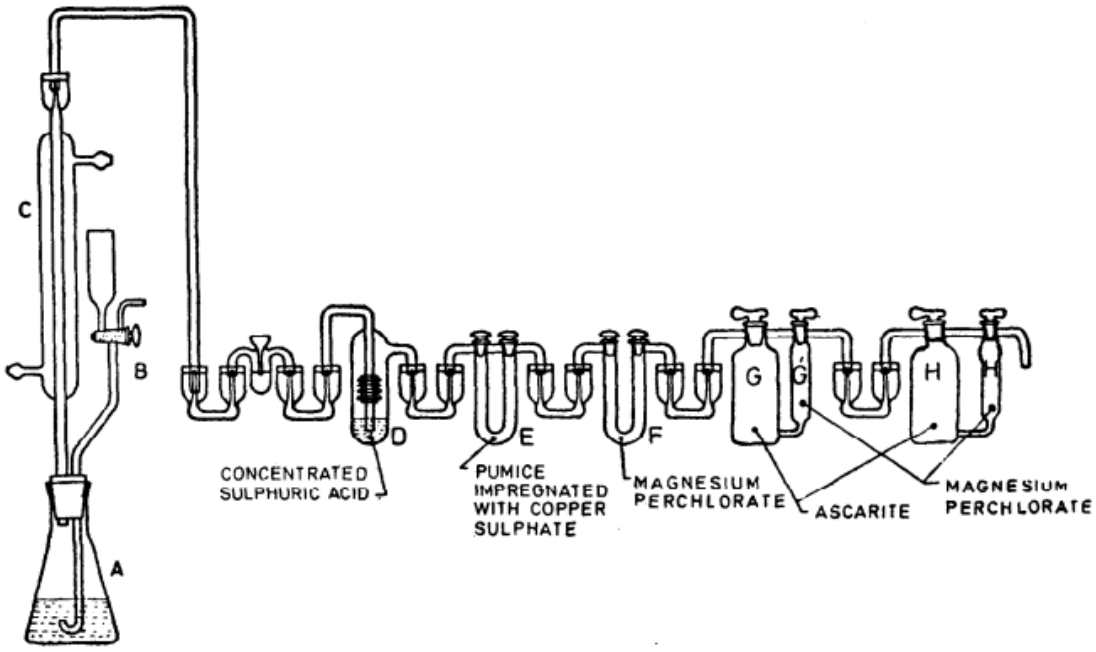
5.3.5 *Pumice Impregnated with Copper Sulphate*

Anhydrous. Crush pumice to approximately 5 mm size, sift free from dust, and transfer 60 g to a casserole. Cover with a concentrated solution of 30 g to 35 g of copper sulphate. Evaporate to dryness while constantly stirring and then heat for 3 h to 4 h at 150 °C to 160 °C in an air-bath. Cool in a dessicator and preserve in a glass-stoppered bottle.

5.4 Procedure

Transfer one gram of the accurately weighed sample to the flask *A* and cover it with water. Insert the stopper carrying the separatory funnel *B* and a condenser *C*. Connect the later with *D*, *E* and *F*. Pass air that is free from carbon dioxide through the system until it is judged that all carbon dioxide is removed. Close the stopcock in the separatory funnel, and insert the weighed absorption bulbs *G* and *H* in the train; the later acts as a guard tube. Half fill the separatory funnel with dilute hydrochloric acid, replace the stopper carrying the air, and see that there is free passage for gases through the train. Open the stopcock in the separatory funnel and run acid into the flask slowly if there is much carbon dioxide and rapidly if there is but little. When effervescence diminishes in the former case, at once

in the latter, start a flow of water in the condenser, and heat the flask slowly so as to secure steady but quiet dissolution. When it is judged that carbon dioxide has been boiled out of the solution, remove the flame, increase the current of air and sweep out all carbon dioxide. Disconnect the weighed bulbs, close the inlet and outlet tubes, and place them in the balance case. When cool, open the stopper momentarily and weigh.



NOTE —Tubes are compactly arranged along the edge of 150 mm × 230 mm board which is supported 130 mm from the table-top upon a tripod base.

FIG. 1 ABSORPTION TRAIN FOR CARBON DIOXIDE

6 CALCULATION

Carbon dioxide, percent by mass = $\frac{m_2 - m_1}{M} \times 100$

where

m_2 = mass, in g, of the bulb after the test;

m_1 = mass, in g, of the bulb before the test; and

M = mass, in g, of sample taken.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Methods of Chemical Analysis of Metals Sectional Committee, MTD 34

Organization	*Representative(s)*
CSIR - National Metallurgical Laboratory, Jamshedpur	DR SANCHITA CHAKRAVARTY **(*Chairperson*)**
Arcelor Mittal Nippon Steel, Mumbai	SHRI MANOJ GUPTA SHRI KIRIT TAILOR (*Alternate*)
Bhabha Atomic Research Centre, Mumbai	MS SANJUKTA A. KUMAR SHRI M. V. RANA (*Alternate*)
CSIR - National Metallurgical Laboratory, Jamshedpur	DR ASHOK K. MOHANTY (*Alternate*)
Defence Metallurgical Research Laboratory, Ministry of Defence, Hyderabad	SHRI S. S. KALYAN KAMAL
Directorate General of Quality Assurance, Ministry of Defence, New Delhi	SHRI KESAVAMOORTHY M. SHRI E. SUMAN KUMAR (*Alternate*)
Geological Survey of India, New Delhi	SHRI NITIN PURUSHOTTAM SHRIMATI SANJUKTA DEY PAL (*Alternate*)
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Indian Metals and Ferro Alloys Limited, Bhubaneswar	SHRI DINESH KUMAR MOHANTY
Jawaharlal Nehru Aluminium Research Development and Design Centre, Nagpur	DR UPENDRA SINGH
JSW Steel Limited, Mumbai	SHRI KOTRABASAVARAJU SHRI MARULASIDDESHA U. M. (*Alternate*)
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Tata Steel Limited, Kolkata	DR JATIN MOHAPATRA
TRL Krosaki Refractories Limited, Belpahar	SHRI S. K. SUBUDHI

Organization	*Representative(s)*
BIS Directorate General	SHRI SANJIV MAINI, SCIENTIST 'F'/SENIOR DIRECTOR AND HEAD (METALLURGICAL ENGINEERING) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
SHRI ASHISH PRABHAKAR WAKLE
SCIENTIST 'D'/JOINT DIRECTOR
(METALLURGICAL ENGINEERING), BIS

Bureau of Indian Standards

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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