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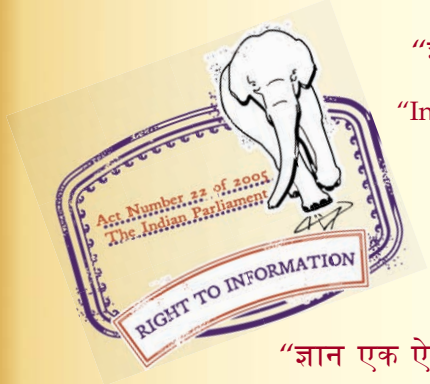

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"Knowledge is such a treasure which cannot be stolen"

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IS : 3605 - 1984
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Indian Standard

SPECIFICATION FOR BAUXITE FOR CHEMICALS AND PETROLEUM INDUSTRIES

(First Revision)

UDC 622.349.21 : 66+665.6

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

***July* 1984**

Gr 3

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SPECIFICATION FOR BAUXITE FOR CHEMICALS AND PETROLEUM INDUSTRIES

(First Revision)

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Indian Standard

SPECIFICATION FOR BAUXITE FOR CHEMICALS AND PETROLEUM INDUSTRIES

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 19 March 1984, after the draft finalized by the Inorganic Chemical (Miscellaneous) Sectional Committee had been approved by the Chemical Division Council.

0.2 This standard was first published in 1966. It has been revised in the light of the latest technological developments and the experience gained during all these years. In this revision, the particle size of bauxite meant for petroleum industry for decolourization of wax/mineral oils and test method for the evaluation of decolourization efficiency of bauxite have been incorporated.

0.3 Bauxite covered by this specification is predominantly a trihydrated aluminium oxide (gibbsitic). The common impurities are silica, iron oxide and titanium oxide. Sometimes lime, magnesia, manganese oxide and phosphorus pentoxide may be present in small amounts.

0.4 The major portion of the world output of bauxite is used for the manufacture of alumina required for the production of aluminium metal by electrolysis. An objectionable feature, in this respect, of some of the Indian ores is their high content of titania These ores can be used without any disadvantage for other uses in the chemical and petroleum industries. The second largest use of bauxite is for the preparation of certain salts of aluminium, chiefly alums. Bauxite is also used in the manufacture of artificial abrasives, such as artificial corundum, emery and fused alumina refractories. A large quantity is also used in the manufacture of refractories and aluminous cements. Bauxite after suitable calcining, develops a characteristic porous structure and becomes an extremely efficient refining agent for kerosine and is used for that purpose in the petroleum industry.

0.5 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*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements methods of sampling and test for bauxite, intended for the chemical and petroleum industries.

2. REQUIREMENTS

2.1 Description — The material shall consist predominantly of gibbsite and shall be dirty white, or light grey or cream or pink rock.

2.2 Particle Size — The material shall comply with the particle size as stated below :

Characteristic	*Requirement*
a) Retained on 90-micron IS sieve, percent by mass, *Max*	Nil
b) Passing through 90-micron IS sieve but retained on 212-micron IS sieve, percent by mass, *Max*	90.0
c) Passing through 212-micron IS sieve but retained on 300-micron IS sieve, percent by mass, *Max*	10.0
d) Passing through 300-micron IS sieve, percent by mass, *Max*	1.0

NOTE — Bauxite conforming to the above particle size is designated in trade as 170/50 grade bauxite.

2.3 The material shall comply with the requirements prescribed in Table 1 when tested according to the methods laid down in Appendix A of this standard and in IS : 2000-1962*. Reference to relevant test methods is given in col 4 and 5 of the table.

2.4 Decolourization Efficiency (After Activation) — The material shall also pass the decolourization efficiency test as specified in Appendix B.

*Rules for rounding off numerical values (*revised*),
†Methods of chemical analysis of bauxite.

TABLE 1 REQUIREMENTS FOR BAUXITE FOR CHEMICAL AND PETROLEUM INDUSTRIES

(*Clause* 2.3)

SL No	CHARACTERISTIC	REQUIREMENT	METHOD OF TEST, REF TO	
			Appendix	CI No. in IS : 2000-1962*
(1)	(2)	(3)	(4)	(5)
i)	Loss on ignition, percent by mass, *Max*	32.0	—	5
ii)	Silica (as SiO_2), percent by mass, *Max*	3.0	—	7
iii)	Alumina (as Al_2O_3), percent by mass, *Min*	58.0	—	8
iv)	Iron oxide (as Fe_2O_3), percent by mass, *Max*	2.0	—	9
v)	Titania (as TiO_2), percent by mass, *Max*	4.0	—	12
vi)	Phosphorus pentoxide (as P_2O_5), percent by mass, *Max*	0.3	—	14
vii)	Manganous oxide (as MnO), percent by mass, *Max*	0.1	—	17
viii)	Calcium and magnesium (as CaO), percent by mass, *Max*	2.0	A	—

*Methods of chemical analysis of bauxite.

3. PACKING AND MARKING

3.1 Packing — Unless agreed to otherwise between the purchaser and the supplier, the material shall be supplied in open wagons.

3.2 Marking — A good sized metallic or cardboard label bearing the following information with suitable paint or ink shall be conspicuously displayed on the carrier and also placed inside:

a) Name of the material;
b) Mass of the material;
c) Recognized trade-mark, if any; and
d) Code number to enable the batch of packing to be traced back from record.

3.2.1 The material may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which *is* devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

4. SAMPLING

4.1 Preparation of Test Samples — The procedure for drawing representative samples of the material and the number of tests for each characteristic shall be as prescribed in IS : 1999-1962*.

4.2 Criteria for Conformity

4.2.1 *For Individual Samples* — For those characteristics which are tested on individual samples, the mean and the range of test results shall be computed as follows:

$$\text{Mean } (\bar{X}) = \frac{\text{Sum of individual test results}}{\text{Number of test results}}$$

Range (R) = Difference between the maximum and the minimum values of test results

For declaring the conformity of the lot,

$\bar{X} + 0.6\,R$ shall be less than or equal to the maximum specified requirements, and

$\bar{X} - 0.6\,R$ shall be greater than or equal to the minimum specified requirements.

4.2.2 *For composite Samples* — For declaring the conformity of the lot to the requirements of all the characteristics tested on the composite sample the test results shall satisfy the corresponding specified requirements.

APPENDIX A

[*Clause* 2.3, and *Table* 1, *Item* (viii)]

METHODS OF TEST FOR CALCIUM AND MAGNESIUM

A-0. PRINCIPLE

A-0.1 Calcium and magnesium are determined together complexometrically by titration with EDTA solution.

*Methods of sampling bauxite.

A-1. QUALITY OF REAGENTS

A-1.1 Unless specified otherwise, pure chemicals and distilled water (*see* IS : 1070-1977*) shall be employed in tests.

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

A-2. REAGENTS

A-2.1 Dilute Hydrochloric Acid — approximately 5 N.

A-2.2 Eriochrome Black T Indicator — Dissolve 0.1 g of eriochrome black T in 25 ml of methyl alcohol. Keep the solution in a cool place.

A-2.3 Ammoniacal Buffer Solution (*p*H 10) — Dissolve 54 g of ammonium chloride in about 200 ml of water; and 350 ml of ammonium hydroxide (25 percent NH_3) and dilute to one litre.

A-2.4 Standard Calcium Solution — 0.01 N. Weigh 0.500 4 g of calcium carbonate and dissolve in minimum quantity of dilute hydrochloric acid. Make up the volume with water to one litre. Carbon dioxide shall be boiled off from the calcium solution before making up to one litre.

A-2.5 Standard EDTA Solution — Weigh 2.05 g of disodium ethylene diamine tetra-acetate dihydrate (EDTA) and dissolve in water. Weigh 100 mg of hydrated magnesium chloride ($MgCl_2.6H_2O$) add this to EDTA solution, dissolve and make up the volume to one litre. Standardize the EDTA solution as follows :

Take 25 ml of standard calcium solution in a 250-ml conical flask. Add 50 ml of water, 1 ml of the eriochrome black T indicator and 25 ml of the ammoniacal buffer solution. Heat to 40 to 50°C and titrate with the EDTA solution, maintaining the temperature between 40 to 50°C, until the colour changes from wine red to distinct blue.

$$\text{Normality of the EDTA solution} = \frac{25\ N_1}{V_1}$$

where

N_1 = normality of the standard calcium solution, and

V_1 = Volume of the EDTA solution required for the titration.

*Specification for water for general laboratory use (*second revision*).

A-3. PROCEDURE

A-3.1 Transfer the filtrate obtained from the R_2O_3 determination (*see* **8.3.1** of IS : 2000-1962*) to a 250-ml volumetric flask and dilute to the mark. Mix well and pipette out 100 ml in a conical flask. Add one milliliter eriochrome black T indicator solution and 25 ml of ammoniacal buffer solution. Heat to 40 to 50°C and titrate with standard EDTA solution, maintaining the temperature between 40 to 50°C, until the colour changes from wine red to distinct blue.

A-4. CALCULATION

$$\text{Calcium and magnesium (as CaO), percent by mass } = \frac{2{\cdot}8 V_2 N_2}{M}$$

where

V_2 = volume in ml of standard EDTA solution used in the titration,

N_2 = normality of EDTA solution, and

M = mass in g of the sample represented by the aliquot taken for the titration.

APPENDIX B

(*Clause* 2.4)

TEST FOR DECOLONIZATION EFFICIENCY

B-1. PROCEDURE

B-1.1 The material is first activated by heating at 425°C for 4 hours, cooled and stored out of contact with air in air-tight bottles/containers.

B-1.2 When liquid product of ASTM colour around 3.0 is filtered, through the activated bauxite (at temperature of 110 to 120°C):

a) The first 10 litres of the filtrate/kg of activated bauxite shall not show ASTM colour of more than 1.0, and

b) The decolourizing efficiency is not completely spent up to a minimum of 60 litres of oil filtrate/kg of activated material. This means that six successive lots of 10 litres each of oil filtrate/kg of activated bauxite shall have the ASTM colour lighter than the liquid product used for filtration.

*Methods of chemical analysis of bauxite.

(*Continued from page* 2)

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Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	
Electric current	ampere	A
Thermodynamic temperature	kalvin	K
Luminous Intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plana angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Definition*
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	slemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/M^2

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