भारतीय मानक
Indian Standard

IS 15343 : 2022

सोडिक मृदा उद्धार के लिए प्रेसमड — विशिष्टि

(पहला पुनरीक्षण)

Pressmud for Reclamation of Sodic Soil — Specification

(First Revision)

ICS 13.080

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FOREWORD

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

Pressmud is used as an organic manure in agricultural fields. The material generally contains 20 percent carbon and 25 : 1 ratio of carbon to nitrogen which play an important role in the growth and development of crop plants.

This standard was first published in 2003. In this revision, scope of standard has been modified and moisture content reduced from 30 percent to 25 percent. Further, Amendment No.1 to IS 15343 : 2003 has been incorporated and latest version of referred standards has been provided.

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

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 values should be the same as that of the specified value in this standard.

Indian Standard

PRESSMUD FOR RECLAMATION OF SODIC SOIL — SPECIFICATION

(First Revision)

1 SCOPE

This standard prescribes the requirements and methods of sampling and test for pressmud to be used for reclamation of sodic soil.

2 REFERENCES

The following standards 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 editions of the standards indicated below:

IS No.	*Title*
9738 : 2003	Polyethylene bags for general purposes — Specification (*second revision*)
10627 : 1983	Methods of sampling of pesticidal formulations
14684 : 1999	Determination of nitrogen and nitrogenous compounds in soils

3 TERMINOLOGY

3.1 Description — Pressmud is a by-product of sugar industry. It is a rich source of organic matter and can be supplemented for chemical fertilizers for the sustained productivity of the soil and a cheaper source for improving the sodic soils when used along with 25 percent gypsum requirement of the soil.

4 REQUIREMENTS

The material shall comply with the requirements given in Table 1.

5 PACKING AND MARKING

5.1 Packing

The materials shall be packed in polyethylene bags of 50 kg according to IS 9738 or in tractor trolleys in loose form.

5.2 Marking

5.2.1 The bag should be marked legibly and indelibly with following information:

a) Name of the material;
b) Name and address of the supplier;
c) Date of production;
d) Batch No.; and
e) Net quantity, in kg.

In case the material is supplied in loose, the above information should be given in a printed form for each batch.

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

When the material is offered in bulk quantity for inspection, representative sample shall be drawn as prescribed in IS 10627 for all the bags/loose material to be tested.

Table 1 Requirement of Pressmud

(*Clause* 4)

Sl No.	Characteristics	Requirements	Methods of Test, Ref to	
			Annex of this standard	Other IS No.
(1)	(2)	(3)	(4)	(5)
i)	Organic carbon, percent by mass, *Min*	20	A	–
ii)	C/N ratio, *Max*	25 : 1	A (for carbon)	IS 14684 (for nitrogen)
iii)	Calcium, percent by mass, *Min*	0.5	B	–
iv)	Phosphate (as P_2O_5), percent by mass, *Min*	2.5	B	–
v)	Sulphur as sulphate, percent by mass, *Min*	2.5	C	–
vi)	pH value (1 : 10), *Max*	7.5	D	–
vii)	Electrical conductivity 1 : 10 (ds/m), *Max*	4	E	–
viii	Moisture, percent by mass, *Max*	25	F	–

ANNEX A

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

ORGANIC CARBON

A-1 ESTIMATION OF ORGANIC CARBON

A-1.1 Walkley and Black Rapid Titration

The organic matter of the pressmud gets oxidized by chromic acid (potassium dichromate plus concentrated sulphuric acid) utilizing the heat of dilution of sulphuric acid. The un-reacted dichromate is determined by back titration with ferrous (ammonium) sulphate (redox titration).

A-2 APPARATUS

A-2.1 Conical Flask, 500 ml.

A-2.2 Burette, 50 ml.

A-3 REAGENTS

A-3.1 Phosphoric Acid, 85 percent.

A.3.2 Sulphuric Acid, 96 percent containing 1.25 percent Ag_2SO_4.

A-3.3 Standard 1 N $K_2Cr_2O_7$ Solution, dissolve 49.04 g $K_2Cr_2O_7$ in water and dilute to 1 litre.

A-3.4 Standard 0.5 N Ferrous Ammonium Sulphate Hexahydrate Solution, dissolve 196.1 g Fe $(NH_4)_2(SO_4)$. $6H_2O$ in 800 ml water containing 20 ml concentrated H_2SO_4 and dilute to 1 litre.

A-3.5 Diphenylamine Indicator, dissolve 0.5 g reagent grade diphenylamine in 20 ml water and 100 ml concentrated H_2SO_4.

A-4 PROCEDURE

Grind oven dried (65 °C for 6 h) pressmud and sieve it with 80 mesh (0.2 mm sieve). Take 0.2 g sample in 500 ml conical flask. Add 50 ml of 1N $K_2Cr_2O_7$ with burette and swirl a little. Then add 100 ml of concentrated H_2SO_4 and swirl again 2 or 3 times. The flask is allowed to stand for 30 min and thereafter 200 ml of water is added. Allow it to cool down to room temperature. Transfer the entire content in 500 ml volumetric flask and make up the volume up to the mark. Take 50 ml aliquot in 250 ml conical flask. Add 100 ml distilled water, 10 ml ortho phosphoric acid and 1 ml of diphenylamine indicator. The contents are titrated with 0.5 N with ferrous ammonium sulphate solution till the colour flashes from blue violet to green. Simultaneously, a blank is run without pressmud.

A-5 CALCULATION

Organic carbon,percent by mass =

$$\frac{15\,(B-T)}{A\times B}$$

where

A = weight of press mud;

B = volume of ferrous ammonium sulphate solution required for blank titration in ml; and

T = volume of ferrous ammonium sulphate needed for pressmud sample.

ANNEX B

[*Table* 1, *Sl No.* (iii) *and* (iv)]

DETERMINATION OF PHOSPHATE AND CALCIUM

B-0 PREPARATION OF HCL EXTRACT FOR DETERMINATION OF PHOSPHATE AND CALCIUM

The air dried 5 g pressmud sample is ignited in muffle furnace. Then the ash is extracted in 100 ml concentrated HC1 acid and 15 to 20 ml of HNO_3 in 500 ml beaker and then it is boiled for 3 to 4 h on sand bath. After this filter the solution with Whatman filter paper No. 42 in a 1 000 ml volumetric flask. Make the volume of the filtrate with distilled water upto the mark.

B-1 ESTIMATION OF PHOSPHATE IN HYDROCHLORIC ACID EXTRACT QUIMOCIAC REAGENTS

B-1.1 Dissolve 70 g of sodium molybdate dihydrate in 150 ml water. Dissolve 60 g citric acid in mixture of 85 ml HNO_3 and 150 ml water and cool. Gradually add molybdate solution to citric acid-nitric acid mixture with stirring. Dissolve 5 ml synthetic quionoline in mixture of 35 ml HNO_3 and 100 ml water. Gradually add this solution to molybdate citric-nitric acid solution

mix and let it stand for 24 h. Filter it and add 280 ml acetone, dilute to 1 litre with water and mix well. Store in polyethylene bottle.

B-1.2 Procedure

Take 100 ml of HCI extract in a beaker from the stock solution. Add 50 ml of distilled water and 50 ml of quimociac reagent and stir it well. Then heat it for 5 to 10 min on hot plate. After that keep for 3 to 4 h to cool it. Yellow precipitate will develop. Then filter it on cintered glass crucible (Gooch crucible) with the help of electric suction pump. After that the crucible along with precipitate is put in an oven at 250 °C temperature to dry it. Then place the crucible in desiccator for cooling. When the crucible is cooled down, weigh and calculate the P_2O_5 percent as under.

B-1.3 Calculation

Weight of oven dry crucible = *A*

Weight of oven dry crucible + precipitate, in g = *B*

Weight of precipitate, in g = *B* – A

$$P_2O_5, \text{percent by mass} = \frac{(B-A) \times 1\,000 \times 100 \times 0.032\,07}{100 \times 5}$$

or

$$= (B-A) \times 6.414$$

B-2 ESTIMATION OF CALCIUM BY ATOMIC ABSORPTION SPECTROPHOTOMETER

B-2.1 Preparation of Stock Solution

Prepare a calcium stock solution (1 000 mg/1) by dissolving 2.497 g of dried $CaCO_3$ in minimum volume of 1 M hydrochloric acid (about 50 ml) when dissolution is complete, transfer the solution to 1 litre graduated flask and make up to the mark with deionized water, treat it as stock solution A. An intermediate stock solution is prepared by pipetting 50 ml of stock solution A in to 1 litre flask and making up to the mark with deionized water. Treat it as stock solution B, Five standard working solutions are prepared containing 1, 2, 3, 4 and 5 ml of stock solution B and make the volume to 50 ml. The solution will contain 1, 2, 3, 4 and 5 µg/ml calcium.

B-2.2 Procedure

Dilute the HCl extract 10 times. Calibrate the instrument by selecting resonance line wavelength 422.7 nm using fuel lean acetylene air flame. Aspirate the known standards and record their absorbance. Aspirate the unknown sample (working solution B) and record its absorbance. Match the absorbance with that of its concentration of the standard solution to find out the response factor.

B-2.3 Calculation

Calcium, percent by mass = $R \times Rf \times 0.2$

where

R = absorbance of the sample, unknown; and

Rf = response factor which is obtained by reference ppm/absorbance of reference concentration.

Moreover, in computer based A.A.S. the calculation is performed by the apparatus itself provided the programme is entered into system.

ANNEX C

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

ESTIMATION OF SULPHUR AS SULPHATE

C-1 MEHTOD OF ESTIMATION OF SULPHUR AS SULPHATE

C-1.1 Preparation of Solution

Weigh 1 g sample into large porcelain crucible. Add 7.5 ml $Mg(NO_3)_2$ solution (dissolve 950 g P-free Mg $(NO_3)_2$ $6H_2O$ in H_2O and dilute to 1 litre) so that all material comes in contact with solution. Heat on electric hot plate (180 °C) until no further action occurs. Transfer crucible while hot to furnace (≤ 500 °C) and let it remain until sample is thoroughly oxidized (no black particles should remain. If necessary, break up sample and return to furnace). Remove crucible and let cool. Add H_2O then HCl in excess. Bring solution to boil, filter, and wash thoroughly. If preferred, transfer solution to 250 ml volumetric flask before filtering and dilute to volume with H_2O.

C-2 DETERMINATION

Dilute aliquot of prepared solution to 200 ml with H_2O and add HCl until 0.5 ml free acid is present. Heat to boiling point and add 10 ml 10 percent $BaCl_2$ solution drop-wise with constant stirring. Continue boiling 5 min and let stand for ≥ 5 h in warm place. Decant through ash less paper or ignited and weighed Gooch. Add 15-20 ml boiling H_2O to precipitate, transfer to filter, and wash with boiling H_2O until filtrate is Cl free. Dry precipitate and filter, ignite, and weigh as $BaSO_4$.

C-3 CALCULATION

Weight of $BaSO_4$ precipitate = A

Sulphur (as SO_4), percent by mass = $A \times 0.137\ 4 \times 3$

ANNEX D

[*Table* 1, *S1 No.* (vi)]

DETERMINATION OF *p*H

D-1 DETERMINATION OF *p*H

Take 5 g prepared pressmud sample in 100 ml beaker Add 50 ml distilled water and stir with glass rod. Keep it for 30 min. Stir it again and record *p*H reading with *p*H meter after calibrating the instrument with buffers of *p*H 4.0 and 9.0.

ANNEX E

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

DETERMINATION OF ELECTRICAL CONDUCTIVITY

E-1 Calibrate the conductivity meter with 0.01 M KCl solution. Record the electrical conductivity in the above supernatant liquid used for *p*H determination.

ANNEX F

[*Table* 1, *S1 No*. (viii)]

ESTIMATION OF MOISTURE

F-1 ESTIMATION OF MOISTURE PERCENTAGE

Take about 10 g of pressmud sample in oven dry aluminium dish. Then place it in hot air oven at the temperature of 65 °C for 6 h. After this, put the dish in desiccator to cool it. Then weigh the dish and calculate the moisture percentage as below.

F-2 CALCULATION

Weight of the empty dish = *A*

Weight of the empty dish and pressmud sample = *B*

Weight of the dish and dried pressmud = C

Moisture, percent by mass =

$$\frac{B-C}{B-A}\times 100$$

NOTE — All the analysis should be done on air dry basis, however, the results should be expressed on oven dry basis.

ANNEX G

(*Foreword*)

COMMITTEE COMPOSITION

Soil Quality and Fertilizers Sectional committee, FAD 07

Organization	*Representative(s)*
Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya	Dr A. K. Singh (***Chairman***)
Bidhan Chandra Krishi Vishwavidyalaya, West Bengal	Prof B. Mandal Prof G. C. Hazra (*Alternate*)
CCS Haryana Agricultural University, Hissar	Head (Soil Science) Head (Microbiology) (*Alternate*)
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Chambal Fertilizers and Chemicals Ltd, New Delhi	Dr Naresh Prasad Dr A. K. Baranwal(*Alternate*)
Consumer Guidance Society of India, Mumbai	Dr Sitaram Dixit
Fertilizer Association of India, New Delhi	Dr R. K. Tewatia
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Indian Micro Fertilizers Manufacturers Association, Pune	Shri Mahesh G. Shettry
Indian Agricultural Research Institute, New Delhi	Head (Soil Science) Head (Microbiology) (*Alternate*)
Indian Farmer Fertilizer Co-operative Limited (IFFCO), New Delhi	
Indian Institute of Soil Science, Bhopal	Dr Ashok K. Patra Dr M. C. Manna, (*Alternate*)
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BIS Directorate General	Shrimati Sunneti Toteja, Scientist 'E' and Head (FAD) [Representing Director General (*Ex-officio*)]

Member Secretary

Shri RAJPAL
Scientist 'D' (FAD), 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.

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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.

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Amend No.	Date of Issue	Text Affected

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