



DRAFT TANZANIA STANDARD

Calcium Phosphate – animal feed grade – Specification

PUBLIC COMMENTS

0 Foreword

Calcium phosphate- animal feed grade is an important source of Calcium and Phosphorus for use in concentrates, compounded feeds and other animal feeds for domesticated animals such as cattle, goats, sheep, pigs and poultry.

Calcium and phosphorus have significant roles in animal physiological functions. Feed grade Calcium phosphate is an important additive in animal feeds. Calcium phosphate is widely used in feeds because of its high bioavailability of nutrients.

This Tanzania standard would help in exercising proper quality and safety control for animal feed grade Calcium phosphate, produced or traded in the country for feeding domesticated animals.

In preparation of this draft Tanzania standard considerable assistance has been derived from IS 5470: 2002, Dicalcium phosphate, animal feed grade – specification.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with TZS 4 (see clause 2).

1.0 Scope

This Tanzania standard specifies requirements, methods of sampling and test for monocalcium phosphate (MCP), monocalcium phosphate (MDCP), dicalcium phosphate (DCP) and tricalcium phosphate (TCP) as mineral supplements in animal feeds.

2.0 References

For the purpose of this draft Tanzania Standard, the following references shall apply. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

TZS 4 – Rounding off numerical values.

TZS 34-3 – Animal feeds and feeding stuffs – Part 3 – Microbiological test methods.

TZS 34-2 – Animal feeds and feeding stuffs – Sampling and test methods – Part 2: Minerals and trace elements.

TZS 34-1 – Animal feeds and feeding stuffs – Part 1 Sampling and general methods.

TZS 76 – General method for determination of Arsenic silver diethyldithiocarmate photometric method.

TZS 109 – Food Processing units – code of hygiene – General.

TZS 268 – General atomic absorption spectrophotometric method for determination of lead in food stuffs

TZS 538:1999 – Packaging and labeling of foods

TZS 821 – Animal feeds and feeding stuffs – Preparation of test samples.

ISO 5985 – Animal feeding stuffs – Determination of ash insoluble in hydrochloric acid.

AOAC 2006.03 – Arsenic, Cadmium, Cobalt, Chromium, Lead, Molybdenum, Nickel, and selenium in fertilizers

3.0 Terms and definitions

For the purpose of this draft standard, the following terms and definitions shall apply:

3.1 monocalcium phosphate (MCP)

an inorganic compound with the chemical formula of $\text{Ca}(\text{H}_2\text{PO}_4)_2$. It is commonly found as the monohydrate with the formula of $\text{Ca}(\text{H}_2\text{PO}_4)_2 \cdot \text{H}_2\text{O}$

3.2 monodicalcium phosphate (MDCP)

a calcium phosphate which is an intermediate between MCP and DCP and obtained by reacting pure mineral sources of calcium with purified phosphoric acid or dicalcium phosphate with purified phosphoric acid with chemical formula of $\text{Ca}(\text{H}_2\text{PO}_4)_2 \cdot \text{H}_2\text{O} + \text{CaHPO}_4 \cdot 2\text{H}_2\text{O}$

3.3 dicalcium phosphate (DCP)

a dibasic calcium phosphate usually found as the dihydrate, with the chemical formula of $\text{CaHPO}_4 \cdot 2\text{H}_2\text{O}$, but it can be thermally converted to the anhydrous form

3.4 tricalcium phosphate (TCP)

a calcium salt of phosphoric acid with the chemical formula of $\text{Ca}_3(\text{PO}_4)_2$. It is also known as tribasic calcium phosphate and bone phosphate of lime (BPL)

3.5 feed/feedstuff/feeding stuff

single or multiple materials, whether processed, semi-processed or raw, and whether or not containing additives, for oral animal feeding

3.6 feed additive

substance intentionally added to *feed* and/or water, not consumed as feed by itself, whether or not it has a nutritional value, that affects the characteristics of feed including organoleptic properties, animal products, animal production or performance or welfare, or the environment

Note 1 to entry: Microorganisms, enzymes, acidity regulators, trace elements, vitamins and other products fall within the scope of this definition, depending on the purpose of use and the method of administration.

Note 2 to entry: *Coccidiostats* and *histomonostats* are a category of feed additives.

Note 3 to entry: Feed additive does not include *feed materials* and *premixtures*.

3.7 supplement

feed ingredient used with another to improve the nutrient balance or performance of the animal and that can be fed undiluted, diluted and mixed to produce a *complete feed* or as *free choice* with other parts of the *ration*

3.8 concentrates

feed that contains high amounts of a nutrient or nutrients (usually rich in energy and/or protein but low in fibre) and mixed with other ingredients [usually *micro-ingredients*] intended to be diluted or mixed to produce a *complementary feed* or a *complete feed*

Note: Concentrate may be unsafe if fed *free choice* or alone.

3.9 complete feed

nutritionally adequate *feed* compounded by a specific formula that is used as the sole *ration* and that is capable of maintaining life and/or promoting production without any additional substance except water

Note 1 to entry: Complete feed is a form of *compound feed*

3.10 compounded feeds

mixture of at least two feed materials, whether or not containing feed additives, for oral animal feeding in the form of a complementary feed or a complete feed

4.0 Requirements

4.1 General requirements

4.1.1 Calcium phosphate shall be tasteless, odorless, grey/white and free flowing powder or granular. Practically, the product shall be insoluble in alcohol and soluble in diluted acids (Hydrochloric acid and Nitric acid).

4.1.2 The particle size of the material shall be such that, when sieved, not more than 10 percent of the material retained on 200-micron sieve.

4.2 Specific requirements

Calcium phosphate shall conform to the requirements prescribed in Table 1.

Table 1: Physico-chemical requirements

S/No	Characteristic	Requirements				Test Method (see clause 2)
		MCP	MDCP	DCP	TCP	
i)	Moisture, percent by mass, max.	5	5	5	5	TZS 34-1
ii)	Calcium (Ca), percent by mass, min.	15	18	23	32	TZS 34-2
iii)	Phosphorus (P), percent by mass, min.	23	21	18	16	TZS 34-2
iv)	Fluorine (F), percent by mass, max.	0.1	0.1	0.1	0.1	ANNEX A
v)	Acid insoluble ash, percent by mass, max	1.0	1.0	1.0	1.0	ISO 5985
vi)	Total ash, percent by mass	73.5-78.0	73.5-78.0	73.5-78.0	73.5-78.0	TZS 34-1
vii)	Presence of proteins/organic impurities	Absent	Absent	Absent	Absent	TZS 34-1

5.0 Contaminants

The products covered by this Standard shall comply with the maximum limits for heavy metals specified in Table 2.

Table 2: Heavy metal contaminants

S/No.	Heavy metal	Limits	Method of test (see clause 2)
i)	Mercury (Hg), mg/kg, max	0.1	AOAC 2006.03
ii)	Lead (Pb), mg/kg, max	15	TZS 268
iii)	Arsenic (As), mg/kg, max	10	TZS 76
iv)	Cadmium (Cd), mg/kg, max	10	AOAC 2006.03

6.0 Hygiene

6.1 The product shall be prepared under strict hygienic conditions according to TZS 109 (see clause 2).

6.2 The product on testing shall not contain the listed microorganisms in Table 3.

Table 3: Microbiological limits

S/No.	Microorganisms	Limit	Methods of test (see clause 2)
i)	<i>Bacillus anthracis</i>	Absent	TZS 34-3
ii)	<i>Clostridium spp.</i>	Absent	TZS 34-3

7.0 Sampling and tests

7.1 Sampling

Sampling of the product covered under this standard shall be done according to TZS 34-1 (see clause 2).

7.2 Tests

Testing of this product shall be done according to test methods prescribed in Table 1, 2 and 3 (see clause 2).

8.0 Packaging, marking and labelling

8.1 Packaging

The material shall be packed in moisture-proof bags, cartons, boxes or drums. All containers shall be sound, clean and free from causal agents of infectious diseases and parasites.

8.2 Marking and labelling

In addition to marking and labelling requirements prescribed in TZS 538, Calcium phosphate for each container shall be marked to display the following information:

- a) Name of the product – “Monocalcium phosphate”, “Monodicalcium phosphate”, “Dicalcium phosphate” or “Tricalcium phosphate”;
- b) Name and address of the manufacturer;
- c) Country of origin
- d) Batch or code number;
- e) Date of production;
- f) Net weight in metric units;
- g) Expiry date;
- h) Storage conditions;
- i) Content of Calcium and Phosphorus;

8.3 The container may also be marked with TBS Certification Mark.

NOTE – The TBS Standards Mark of Quality may be used by the manufacturers only under licence from TBS. Particulars of conditions under which the licences are granted may be obtained from TBS.

ANNEX A – DETERMINATION OF FLUORINE

A.1 APPARATUS

A.1.1 Distillation flasks

A.1.2 Nessler tubes – of 50 ml capacity

A.1.3 Microburette

A.2 REAGENTS

A.2.1 Limewater freed from fluorine – Dissolve lime in an excess of perchloric acid. Boil for 15 minutes. Dilute, cool and neutralize with fluorine-free sodium hydroxide. Filter through a Buchner funnel and wash. Make a saturated solution in distilled water using the lime thus freed from fluorine.

A.2.2 Perchloric acid solution – 60 % to 70 % (m/v). Heat some quantity for an hour or longer at 140 °C to 150 °C.

A.2.3 Silver perchlorate solution – 1 % (m/v). Prepare by adding sufficient sodium hydroxide solution to a solution of silver nitrate to cause precipitation. Filter and wash the precipitate with water. Dissolve the precipitate in perchloric acid and dilute.

A.2.4 Sodium hydroxide solution – 0.05 M

A.2.5 Alizarin indicator solution – Dissolve 0.02g of sodium alizarin sulphonate in water and make up the volume to 100 ml.

A.2.6 Dilute hydrochloric acid – 0.05 M

A.2.7 Buffer solution – Dissolve 0.10 g of hydroxylamine hydrochloride in water and make up the volume to 100 ml.

A.2.8 Thorium nitrate solution

Dissolve 0.5 g of hydrated thorium nitrate ($\text{Th}(\text{NO}_3)_4 \cdot 12\text{H}_2\text{O}$) in distilled water and make up the volume to one litre.

A.2.9 Standard fluorine solution – Dissolve 2.211 g of sodium fluoride in water and make up the volume to one litre in a graduated flask. Pipette out 10 ml of this solution into a one litre graduated flask and make up the volume. This solution contains 0.01 mg of fluorine per millilitre.

A.3 PROCEDURE

A.3.1 Weigh accurately about 5 g of the material in a platinum dish. Moisten with lime water. Dry on a water bath and ignite in a muffle furnace at about 550 °C. When the ashing is complete, cool and transfer to a distillation flask, washing it with water.

Dissolve the residual ash in 10 to 15 ml of perchloric acid solution and transfer to the same distillation flask. Add sufficient silver perchlorate solution to bring about complete precipitation. Steam-distil at $132\text{ °C} \pm 3\text{ °C}$ into another flask containing 2 ml of the sodium hydroxide solution. Collect about 150 ml of the distillate. Transfer the distillate to a 200-ml graduated flask and make up the volume to the mark with water.

A.3.2 Transfer a suitable aliquot of the test solution containing 10 mg to 30 mg of fluorine to a Nessler tube. Add one milliliter of alizarin indicator solution. Take the same quantity of the indicator solution in another Nessler tube. If necessary, the alkali in the test solution is neutralized with a drop or two of dilute hydrochloric acid. To each tube add one millilitre of the buffer solution, 2.0 ml of dilute hydrochloric acid and dilute to about 45 ml. The colour of the solutions should be straw yellow. Add the thorium nitrate solution from a macroburette to the test solution until a permanent slight pink colour appears (0.5 to 2.0 ml of the thorium nitrate solution would be required).

Add an equal volume of the thorium nitrate solution to the other Nessler tube. Adjust the colour of the solution in this Nessler tube by adding the standard fluorine solution from a microburette to the same intensity as the colour of the test solution. When the colours in both the tubes match, the amount of fluorine in the standard fluorine solution added is equal to the amount of fluorine present in the aliquot of the test solution. From this, calculate the amount of fluorine present in 100 g of the material on moisture-free basis.

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