

ICS 87.060.10



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 1707-2012

Lithopone
(English Translation)

Issued on: December 31, 2012

Implemented on: August 1, 2013

Issued by: General Administration of Quality Supervision, Inspection and

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1 Scope

This Standard specifies the product classification, requirements, test methods, inspection rules, marking, packaging and storage of lithopone.

This Standard is applicable to white pigments produced by calcining a co-precipitate of zinc sulfide and barium sulfate in approximately equimolar ratios. The product is mainly used in the coatings, inks, rubber, and plastics industries.

2 Normative References

The following documents are indispensable for the application of this document. In terms of references with a specified date, only the version with that specific date is applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 1864-2012 General methods of test for pigments and extenders - Comparison of colour of pigments (ISO 787-1:1982, MOD) GB/T 3186 Paints, varnishes and raw materials for paints and varnishes - Sampling (GB/T 3186-2006, ISO 15528:2000, IDT) GB/T 5211.2-2003 Determination of water-soluble matter of pigments - Hot extraction method (ISO 787-3:2000, IDT) GB/T 5211.3 Determination of volatile matter of pigments at 105°C (GB/T 5211.3-1985, eqv ISO 787-2:1981) GB/T 5211.13 Determination of acidity or alkalinity of the aqueous extract of pigments (GB/T 5211.13-1986, eqv ISO 787-4:1981) GB/T 5211.15 Determination of oil absorption value of pigments (GB/T 5211.15-1988, eqv ISO 787-5:1980) GB/T 5211.16-2008 Comparison of lightening power of white pigments

(ISO 787-17:2002, IDT) GB/T 5211.17-1988 Comparison of contrast ratio (hiding power) of white pigments (neq ISO 2814:1973) GB/T 5211.18-1988 Determination of residue on sieve of pigments - Water method - Manual procedure (neq ISO 787-7:1981) GB/T 5211.20-1999 Comparison of the colour, in full-shade systems, of white, black and coloured pigments - Colorimetric method (eqv ISO 787-25:1993) GB/T 6682 Water for analytical laboratory use - Specification and test methods (GB/T 6682-2008, ISO 3696:1987, MOD) GB/T 8170 Rules of rounding off for numerical values & expression and judgement of limiting values

3 Product Classification

Based on the zinc sulfide content, the product is divided into two categories. 20% lithopone and 30% lithopone.

The 20% lithopone corresponds to variety C201;

The 30% lithopone is further divided into four varieties based on the surface treatment method.

B301, B302 (surface treated), B311, and B312 (surface treated).

4 Requirements

The product shall meet the requirements of Table 1.

Table 1 -- Requirements

5 Sampling

The products shall be sampled according to GB/T 3186, or by an agreed-upon method. The sample size shall be determined according to the testing requirements.

6.1.1 General

The barium sulfate content is determined using the gravimetric method. The total zinc content can be determined using either Method A (potassium hexacyanoferrate titration) or Method B (Na₂EDTA titration). The arbitration test for total zinc content uses Method A (potassium hexacyanoferrate titration).

6.1.2 Determination of barium sulfate and total zinc content - Method A (potassium

hexacyanoferrate titration)

6.1.2.1 Principle

Dissolve zinc sulfide and zinc oxide in the specimen with hydrochloric acid, then add sulfuric acid to maintain a certain acidity and perform solid-liquid separation. Determine the barium sulfate content of the solid using the gravimetric method. For the liquid, titrate the total zinc content with potassium hexacyanoferrate (II) using diphenylamine as an indicator at a pH of 1.5 ~ 3.0.

6.1.2.2 Reagents

Unless otherwise specified, all reagents used shall be of analytical grade, and water with a purity of at least Grade III as specified in GB/T 6682 shall be used.

Warning-Reagents shall be used in accordance with appropriate health and safety regulations.

6.1.2.2.1 Hydrochloric acid. 1+2

Add 1 volume of concentrated hydrochloric acid (approximately 37% by mass, $\rho \sim 1.19$ g/mL) to 2 volumes of water.

6.1.2.2.2 Sulfuric acid. 1+8

Carefully add 1 volume of sulfuric acid (approximately 96% by mass, $\rho \sim 1.84$ g/mL) to 8 volumes of water.

6.1.2.2.3 Concentrated ammonia solution. Density. 0.9 g/mL.

6.1.2.2.4 Ammonia solution. 1+3

Add 1 volume of concentrated ammonia solution to 3 volumes of water.

6.1.2.2.5 Diphenylamine indicator. 50 g/L ethanol solution.

6.1.2.2.6 Congo red test paper.

6.1.2.2.7 Lead acetate test paper.

6.1.2.2.8 Zinc chloride standard solution. Contains approximately 5 g of zinc per liter

[concentration (c) is expressed as grams of zinc per milliliter of solution].

Weigh approximately 5 g of high-purity zinc (accurate to 0.1 mg), dissolve it in 300 mL of hydrochloric acid solution (6.1.2.2.1), and transfer the solution to a 1 000 mL volumetric flask.

Dilute to the mark with water and shake well.

6.1.2.2.9 Potassium hexacyanoferrate (II) standard solution. $c[\text{K}_4\text{Fe}(\text{CN})_6] \sim 0.05$ mol/L [titer

(T1) is expressed as grams of zinc per milliliter of solution].

6.1.2.2.9.1 Preparation

Dissolve 21.0 g of potassium hexacyanoferrate (II), 0.3 g of potassium hexacyanoferrate (III), and 2 g of anhydrous sodium carbonate (for solution stabilization) in water, and transfer the solution to a 1 000 mL volumetric flask. Dilute to the mark with water and shake well.

6.1.2.2.9.2 Standardization

Pipette 25 mL of zinc chloride standard solution (6.1.2.2.8) into a beaker. Add ammonia solution (6.1.2.2.4) until Congo red test paper (6.1.2.2.6) just turns pure red in the solution.

Then carefully add hydrochloric acid (6.1.2.2.1) dropwise to neutralize, adding a few drops in excess until the Congo red test paper turns a stable blue (pH 1.5-3.0).

Dilute with water to 150 mL, heat this solution to boiling, and add 10 drops of diphenylamine indicator (6.1.2.2.5).

Immediately titrate with potassium hexacyanoferrate (II) solution (6.1.2.2.9) until the solution turns a stable yellow or yellow-green color.

Then, back-titrate the solution with zinc chloride standard solution (6.1.2.2.8) until the solution color just turns blue again.

The solution temperature must be maintained above 80°C throughout the titration process.

6.1.2.2.9.3 Calculation of titer

Calculate the titer (T1) of the potassium hexacyanoferrate (II) standard solution according to Formula (1), expressed in grams per milliliter (g/mL).

Where.

c -- Concentration of zinc chloride standard solution, in grams per milliliter (g/mL);

V_2 -- Volume of zinc chloride standard solution consumed during back titration, in milliliters (mL);

V_1 -- Volume of potassium hexacyanoferrate (II) standard solution consumed during titration, in milliliters (mL).