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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB 15892-2020

Replacing GB 15892-2009

Polyaluminium chloride for the treatment of drinking water

生活饮用水用聚氯化铝

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8 Marking, packaging, transportation and storage

1 Scope

China's mandatory standard for polyaluminium chloride used to treat drinking water - the coagulant dosed at the head of almost every waterworks in the country, which makes the suspended matter in raw water clump together so that it can be settled and filtered out. It is the largest single chemical addition made to public water supply, and everything in it that is not aluminium ends up either in the sludge or in the water people drink. The standard specifies the requirements, the test methods, the inspection rules, and the marking, packaging, transport and storage of polyaluminium chloride for the treatment of drinking water. The requirements have two halves that answer two different questions. The first is whether the product works: the aluminium oxide content, which is what is being paid for and dosed on, the basicity, which governs how the coagulant behaves at the pH of the water being treated, the density, the pH of the solution and the insoluble matter. The second is whether it is safe to put in drinking water, and that is where a drinking water grade differs from an industrial one: the limits on the heavy metals and other toxic impurities carried in from the raw materials - arsenic, lead, cadmium, mercury, chromium and the rest - which are set against the fact that the product is dosed continuously into water that will be drunk, so that an impurity at a few parts per million in the chemical becomes a permanent low-level addition to the supply. The test methods clause is correspondingly the longest part of the document, and the inspection rules set how a batch is sampled and accepted before it is allowed onto a works. Issued on 23 July 2020 and in force since 1 August 2021, it replaces GB 15892-2009.

This Standard specifies the requirements, test methods, inspection rules, marking, packaging, transportation and storage of polyaluminium chloride for treatment of drinking water. This Standard applies to polyaluminium chloride for treatment of drinking water. The product is mainly used for the purification of drinking water.

2 Normative references

The following documents are indispensable for the application of this document. For the dated references, only the editions with the dates indicated are applicable to this document. For the undated references, the latest edition (including all the amendments) are applicable to this document.

GB/T 191 Packaging - Pictorial marking for handling of goods

GB/T 320 Synthetic hydrochloric acid for industrial use

GB/T 601 Chemical reagent - Preparations of reference titration solutions

GB/T 602 Chemical reagent - Preparations of standard solutions for impurity

GB/T 603 Chemical reagent - Preparations of reagent solutions for use in test methods

GB/T 610-2008 Chemical reagent - General method for the determination of arsenic

GB/T 4294 Aluminium hydroxide

GB/T 6678 General principles for sampling chemical products the excess EDTA solution, to get alumina (Al2O3) content.

6.2.1.2 Reagents and materials 6.2.1.2.1 Carbon dioxide-free water. 6.2.1.2.2 Nitric acid solution: 1+12. 6.2.1.2.3 Aqueous ammonia solution: 1+1. 6.2.1.2.4 Disodium ethylenediaminetetraacetic acid (EDTA) solution: c(EDTA) is about

0.05 mol/L. 6.2.1.2.5 Acetic acid-sodium acetate buffer solution (pH=5.5): WEIGH 272 g of sodium acetate (trihydrate) and dissolve it in water; ADD 19 mL of glacial acetic acid; and dilute to 1000 mL. 6.2.1.2.6 Alumina standard solution: 1 mL contains

0.001 g of Al2O3. WEIGH 0.5293 g of high-purity aluminium (>=99.99%), accurate to

0.2 mg. PLACE it in a 200 mL polyethylene cup; ADD 20 mL of water; ADD about 3 g of sodium hydroxide, to make it all dissolved and transparent (if necessary, heat on a water bath). USE hydrochloric acid solution (1+1) to adjust to acidic and then add 10 mL, to make it transparent, cool; TRANSFER to a 1000 mL volumetric flask; DILUTE to the mark and shake well. 6.2.1.2.7 Zinc chloride reference titration solution: c(ZnCl2) is about

0.025 mol/L; prepare as follows:

6.4 Determination of density

6.4.1 Method summary From the depth of immersion when the densitometer reaches the equilibrium state in the measured liquid, read the density value.

6.4.2 Apparatus

6.4.2.1 Densitometer: The division value is

0.001 g/cm3.

6.4.2.2 Constant-temperature water bath: Controllable temperature (20±0.1)°C.

6.4.2.3 Thermometer: The division value is 0.1 °C. standard solution respectively in five 100 mL volumetric flasks. Respectively add

5.0 mL of hydrochloric acid and 20 mL of thiourea solution; USE water to dilute to the mark and shake well; PLACE for more than 30 min. The mass concentrations of arsenic in this series of solutions are 0 μg/L, 4 μg/L, 8 μg/L, 12 μg/L, 16 μg/L, respectively. 6.8.1.4.2 After the instrument is stable, use potassium borohydride-sodium hydroxide solution as the

reducing agent; USE hydrochloric acid solution as the carrier solution; under the best working conditions of the instrument, measure its fluorescence value. USE the measured fluorescence value as the ordinate; USE the corresponding mass concentration of arsenic (μg/L) as the abscissa, to draw a calibration curve and calculate the regression equation.

Note: When using an atomic fluorescence spectrometer for determination, the required potassium borohydride solution concentration, carrier solution concentration, linear range of calibration curves of various elements, pH value of sample solution, etc. will vary depending on the model of the instrument. Users can, according to the instrument model, choose the best test conditions.

6.8.1.5 Analytical procedure 6.8.1.5.1 Pre-cleaning of glassware The glassware used in the test shall, before use, be soaked in nitric acid solution (1+4) for 24 h; then rinsed with water for later use. 6.8.1.5.2 Sample determination WEIGH about

1.5 g of liquid sample or

0.5 g of solid sample, accurate to

0.2 mg; PLACE it in a 100 mL beaker. ADD 30 mL of water, 1 mL of nitric acid solution (1+1); COVER with a watch glass and boil for about 1 min. After cooling to room temperature, transfer to a 100 mL volumetric flask; respectively add

5.0 mL of hydrochloric acid, 20 mL of thiourea solution; USE water to dilute to the mark and shake well. Perform the determination according to the steps of 6.8.1.4.2 (if there is turbidity, use a medium-speed quantitative filter paper to dry-filter before the determination). The arsenic content is obtained from the calibration curve or regression equation.

6.8.1.6 Result calculation The arsenic content is calculated as the mass fraction w4. The value is expressed in %, calculated according to formula (7): arsenic standard stock solution in a 100 mL volumetric flask; USE water to dilute to the mark and mix well. Before use, pipette

10.00 mL of this solution into a 100 mL volumetric flask; USE water to dilute to the mark and mix well. 6.8.2.2.9 Lead acetate cotton.

6.8.2.3 Apparatus 6.8.2.3.1 Spectrophotometer: With a 1 cm absorption cell. 6.8.2.3.2 Arsenic detector: Comply with the provisions of

6.9.1.4 Analytical procedure 6.9.1.4.1 WEIGH about 10 g of liquid sample or

3.3 g of solid sample, accurate to

0.2 mg. PLACE it in a 250 mL beaker; ADD 30 mL of water and 10 mL of nitric acid solution. COVER with a watch glass and boil for 1 min. After cooling to room temperature, transfer to a 250 mL volumetric flask; USE water to dilute to the mark and shake well. This solution is test solution C. 6.9.1.4.2 Respectively pipette