

ICS 71.100.80

CCS G77



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

GB 31060-2014

Water treatment chemicals - Aluminum sulfate

水处理剂 硫酸铝

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Foreword

This document was issued on 22 December 2014 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 October 2015.

It is a GB standard without the /T suffix: compliance is mandatory in China.

1 Scope

GB 31060-2014 is a mandatory national standard for aluminium sulfate used as a water treatment chemical. Aluminium sulfate is the workhorse coagulant of water treatment: added to raw water it hydrolyses, neutralises the charge holding fine particles in suspension, and lets them aggregate into flocs that can be settled and filtered out. Because it is dosed directly into water that will be drunk, its purity is a public health matter rather than a commercial one - the impurities that matter are the heavy metals, arsenic and lead among them, that would otherwise be introduced deliberately into the supply by the very chemical meant to clean it. That is why this is a GB rather than a GB/T: compliance is compulsory. The standard specifies the classification, the requirements, the test methods, the inspection rules, and the marks, labels and packaging for aluminium sulfate. It applies to aluminium sulfate used as a water treatment agent, principally for drinking water and industrial water, and for wastewater and sewage treatment. Under ICS 71.100.80 and CCS G77, it is the reference for chemical manufacturers, water utilities and the health authorities supervising them.

This Standard specifies the requirements, classification, test methods, inspection rules, marks, labels and packaging of aluminum sulfate.

This Standard applies to aluminum sulfate used as a water treatment agent. The product is mainly used for drinking water and industrial water, waste water and sewage treatment. Among them, the raw sulfuric acid used for drinking water shall be industrial sulfuric acid; aluminum-containing raw materials shall be industrial aluminum hydroxide.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 191, Packaging and storage marks

GB/T 601, Chemical reagent -- Preparations of standard volumetric 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 6678, General principles for sampling chemical products

GB/T 6680, General rules for sampling liquid chemical products

GB/T 6682, Water for analytical laboratory use -- Specification and test methods

GB/T 8170, Rules of rounding off for numerical values and expression and

6 Test methods

6.1 General

Reagents used in this Standard, unless otherwise specified, only use analytically pure reagents.

The standard solutions, impurity standard solutions, preparations and products required in the test shall be prepared according to the provisions of GB/T 601, GB/T 602 and GB/T 603 unless other requirements are specified.

6.2 Determination of alumina content

6.2.1 Method summary

The aluminum in the specimen reacts with a known excess of disodium edetate solution to form a complex. When the pH value is about 6, xylene orange is used as the indicator. Use zinc chloride standard titration solution to titrate excess disodium edetate solution.

6.2.2 Reagents and materials

6.2.2.1 Water: meet the grade three water specification in GB/T 6682.

6.2.2.2 Hydrochloric acid solution: 1+1.

6.2.2.3 Sodium acetate solution: 272 g/L.

6.2.2.4 Zinc chloride standard stock solution: $c(\text{ZnCl}_2) = 0.1 \text{ mol/L}$.

6.2.2.5 Zinc chloride standard titration solution: $c(\text{ZnCl}_2) = 0.025 \text{ mol/L}$. Prepare according to GB/T 601 and dilute 4 times.

6.2.2.6 Disodium ethylenediaminetetraacetic acid (EDTA) standard solution: $c(\text{EDTA}) = 0.05 \text{ mol/L}$.

6.2.2.7 Xylene orange indicator solution: 2 g/L.

6.2.3 Analysis steps

6.2.3.1 Preparation of test solution

Weigh about 5 g of solid specimen or 10 g of liquid specimen, accurate to 0.2 mg. Place in a 250 mL beaker. Add 100 mL of water and 2 mL of hydrochloric acid solution. Heat to dissolve and boil for 5 min (filter if necessary). After cooling, transfer all to a 500 mL volumetric flask. Use water to dilute to the scale. Shake well. This solution shall be the test solution A, for the determination of alumina and iron content.

6.2.3.2 Preparation of blank test solution

Weigh $(1.00 \pm 0.01) \text{ g}$ of specimen. Place it in a 100 mL beaker. Add about 50 mL of carbon dioxide-free water to dissolve. Transfer all to a 100 mL volumetric flask. Use carbon dioxide-free water to dilute to the scale. Shake well. Pour the specimen solution into the beaker. Measure its pH value on a pH meter that has been positioned.

6.6 Determination of arsenic content

6.6.1 Atomic fluorescence spectroscopy

6.6.1.1 Method principle

After the specimen is treated with acid, add thiourea to pre-reduce pentavalent arsenic to trivalent arsenic. Then add sodium borohydride or potassium borohydride to reduce and generate arsine, which is decomposed into atomic arsenic by loading argon gas into a quartz atomizer. Atomic fluorescence is excited by the emitted light from an arsenic hollow cathode lamp. Its fluorescence intensity is directly proportional to the concentration of arsenic in the tested solution under fixed conditions. Conduct quantitative comparison with standard series.

6.6.1.2 Reagents and materials

6.6.1.2.1 Water: meet the grade two water specification in GB/T 6682.

6.6.1.2.2 Hydrochloric acid: guaranteed reagent.

6.6.1.2.3 Nitric acid: guaranteed reagent.

6.6.1.2.4 Thiourea solution: 100 g/L.

6.6.1.2.5 Hydrochloric acid solution: 1+49.

6.6.1.2.6 Nitric acid solution: 1+1.

6.6.1.2.7 Potassium borohydride-sodium hydroxide solution: Weigh 2.0 g of sodium hydroxide and 10.0 g of potassium borohydride into a polyethylene beaker. Dissolve with water and dilute to 1000 mL. Store in polyethylene bottles.

6.6.1.2.8 Arsenic standard stock solution: 0.1 mg/mL.

6.6.1.2.9 Arsenic standard solution: pipette 10.00 mL of arsenic standard stock solution into a 100 mL volumetric flask. Use water to dilute to the scale. Mix well. Just before use, pipette 10.00 mL of this solution into a 100 mL volumetric flask. Use water to dilute to the scale. Mix well. 1.00 mL of this solution contains 1 ug of As.

6.6.1.3 Instruments and equipment

6.6.1.3.1 Atomic fluorescence spectrometer: equipped with an arsenic hollow cathode lamp.

before use, pipette 10.00 mL of this solution into a 100 mL volumetric flask. Use water to dilute to the scale. Mix well. 1.00 mL contains 0.001mg of As.