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

GB/T 30901-2025

Replacing GB/T 30901-2014

High purity ammonium fluoride solution

高纯氟化铵溶液

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents". Drafting.

This document replaces GB/T 30901-2014 "High-purity ammonium fluoride solution". Compared with GB/T 30901-2014, the only changes are structural adjustments and rewriting.

Aside from the logical changes, the main technical changes are as follows.

- a) Added EL, UP, and UP-SSS product grades and indicator requirements (see Chapter 5);
- b) The ammonium fluoride content has been changed (see 6.2, 5.2 in the 2014 edition);
- c) The content of UP-SS grade ammonium fluorosilicate has been changed (see 6.2, 5.2 in the 2014 edition);
- d) Fourteen new indicators, including silver, gold, and bismuth, have been added (see 6.2);
- e) The method for determining ammonium fluoride content has been changed to automated potentiometric titration (see 7.3, 6.3 in the 2014 edition);
- f) The method for determining the ammonium fluorosilicate content has been changed to inductively coupled plasma mass spectrometry (see 7.4, 6.4 in the 2014 edition);
- g) The test procedure in the method for determining the content of anions such as chloride has been modified (see 7.7.4, 6.7.4 in the 2014 version);
- h) The test procedures in the determination methods for the content of 35 impurity elements, including silver and aluminum, have been modified (see 7.8.4, 6.8.4 in the 2014

version);

i) The security clause has been removed (see Chapter 10 of the 2014 edition).

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the China Petroleum and Chemical Industry Federation.

This document is under the jurisdiction of the National Technical Committee on Chemical Standardization (SAC/TC63).

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The release history of this document and the document it replaces is as follows.

- First published in 2014, this is the first revision.

1 Scope

This document specifies the classification, requirements, test methods, inspection rules, marking and accompanying documents, packaging, and transportation of high-purity ammonium fluoride solutions. Storage.

This document applies to high-purity ammonium fluoride solutions.

Note. This product is mainly used in industries such as cleaning and etching of solar photovoltaic cells, integrated circuits, and ultra-large-scale integrated circuit chips.

2 Normative references

GB/T 191-2008

GB/T 6678

GB/T 6680

GB/T 6682-2008

GB/T 8170

GB/T 23769-2009

GB/T 23770-2009

JJG814-2015

3 Terms and Definitions

This document does not contain any terms or definitions that need to be defined.

4 Molecular formula and relative molecular mass

Molecular formula. NH_4F .

Relative molecular mass. 37.04 (based on the 2022 international relative atomic mass).

5 Categories

High-purity ammonium fluoride solution is classified into 5 grades according to its intended use.

- a) EL grade. mainly used in the manufacture of solar photovoltaic cells and liquid crystal display devices;
- b) UP grade. Primarily used for cleaning and etching integrated circuits with linewidths of $0.8\mu\text{m}\sim 1.2\mu\text{m}$;
- c) UP-S grade. Primarily used for cleaning and etching of integrated circuits with linewidths of $0.2\mu\text{m}\sim 0.8\mu\text{m}$;
- d) UP-SS grade. Primarily used for cleaning and etching integrated circuits with linewidths of $0.09\mu\text{m}\sim 0.2\mu\text{m}$;
- e) UP-SSS grade. mainly used for cleaning and etching of integrated circuits with line width less than $0.09\mu\text{m}$.

6 Requirements

6.1 Appearance. Colorless and transparent liquid.

6.2 The high-purity ammonium fluoride solution shall conform to the requirements of Table 1 when tested according to the test methods specified in this document. Table 1 project index

EL level	UP level	UP-S level	UP-SS level	UP-SSS level	Ammonium fluoride (NH ₄ F) w/%
35.0±1.0	40.0±1.0				Ammonium fluorosilicate [(NH ₄) ₂ SiF ₆]/(mg/kg) ≤ - - 10 5 1
Chroma/Black Level ≤ 10	10	10	10	5	pH (10 g/L solution, 25°C). 6.0~7.5
Chloride (as Cl)/(mg/kg) ≤ 5	5	0.2	0.05	0.01	Nitrate (as NO ₃)/(mg/kg) ≤ 3 3 0.1 0.05 0.01
Phosphate (as PO ₄)/(mg/kg) ≤ 1	1	0.1	0.05	0.01	Sulfate (as SO ₄)/(mg/kg) ≤ 5 5 0.2 0.05 0.01
Silver (Ag)/(μg/kg) ≤ -10	1	0.1	0.02		Aluminum (Al)/(μg/kg) ≤ 100 10 1 0.1 0.02
Arsenic (As)/(μg/kg) ≤ 300	10	1	0.1	0.02	Gold (Au)/(μg/kg) ≤ -10 1 0.1 0.02
Boron (B)/(μg/kg) ≤ 100	10	1	0.1	0.02	Beryllium (Be)/(μg/kg) ≤ - - 1
Bismuth (Bi)/(μg/kg) ≤ -	10	1	0.1	0.02	Calcium (Ca)/(μg/kg) ≤ 100 10 1 0.1 0.02
Cadmium (Cd)/(μg/kg) ≤ 50	10	1	0.1	0.02	Cobalt (Co)/(μg/kg) ≤ - - 1 0.1 0.02
Chromium (Cr)/(μg/kg) ≤ 20	10	1	0.1	0.02	Copper (Cu)/(μg/kg) ≤ 20 10 1 0.1 0.02
Iron (Fe)/(μg/kg) ≤ 100	10	1	0.1	0.02	Gallium (Ga)/(μg/kg) ≤ - - 1 0.1 0.02
Germanium (Ge)/(μg/kg) ≤ -	10	1	0.1	0.02	Table 1 (continued) project index
UP-SSS level Potassium (K)/(μg/kg) ≤ 100	10	1	0.1	0.02	Lithium (Li)/(μg/kg) ≤ 20 10 1
Magnesium (Mg)/(μg/kg) ≤ 100	10	1	0.1	0.02	Manganese (Mn)/(μg/kg) ≤ 50 10
Molybdenum (Mo)/(μg/kg) ≤ -	10	1	0.1	0.02	Sodium (Na)/(μg/kg) ≤ 100 10 1
Niobium (Nb)/(μg/kg) ≤ - -	1	0.1	0.02	Nickel (Ni)/(μg/kg) ≤ 50 10 1	0.1 0.02
Lead (Pb)/(μg/kg) ≤ 50	10	1	0.1	0.02	Palladium (Pd)/(μg/kg) ≤ -10 1 0.1 0.02
Antimony (Sb)/(μg/kg) ≤ 50	10	1	0.1	0.02	Tin (Sn)/(μg/kg) ≤ 20 10 1 0.1 0.02
Strontium (Sr)/(μg/kg) ≤ -10	1	0.1	0.02	Tantalum (Ta)/(μg/kg) ≤ -10 1 0.1 0.02	Titanium (Ti)/(μg/kg) ≤ 100 10 1
Thallium (Tl)/(μg/kg) ≤ -	10	1	0.1	0.02	Vanadium (V)/(μg/kg) ≤ - - 1 0.1 0.02
Zinc (Zn)/(μg/kg) ≤ 50	10	1	0.1	0.02	Zirconium (Zr)/(μg/kg) ≤ - 10 1 0.1 0.02
Particles/(pieces/mL) (≥1.0μm) ≤ 50	- - - -	(≥0.5μm) ≤ -	25	5 - -	(≥0.2μm) ≤ - - - 10
(≥0.1μm) ≤ - - - -	50				

7 Test Methods

Warning. Some reagents or materials used in this test method are corrosive. Operators should exercise caution and avoid skin contact.

If it comes into contact with skin, rinse immediately with water; in severe cases, seek immediate medical attention.

7.1 General Provisions

Unless otherwise specified, all reagents and water used in this document refer to analytical grade reagents or materials and those specified in GB/T 6682-2008.

Grade III water as specified. Unless otherwise specified, all standard titration solutions, impurity standard solutions, preparations, and products used in the experiment shall be in