

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

HJ 800-2016

**Ambient air-Determination of the water soluble cations (Li+,
Na+, NH₄+, K+, Ca²⁺, Mg²⁺) from atmospheric particles-Ion
chromatography**

环境空气 颗粒物中水溶性阳离子(Li⁺、Na⁺、NH₄⁺、K⁺、Ca²⁺、Mg²⁺)的测定
离子色谱法

(English Translation)

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Foreword

In order to implement the Environmental Protection Law of the People's Republic of China and the Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution, Environment, the protection of human health, regulate the ambient air particles in the determination of water-soluble cations, the development of this standard.

This standard specifies the determination of six kinds of water-soluble cations (Li, PM₁₀, PM_{2.5}, dust, etc.) in ambient air particulate matter (TSP, Na, NH₄, K, Ca²⁺, Mg²⁺).

This standard is the first release.

Appendix A to this standard is a normative appendix, Appendix B to Appendix C are informative.

This standard is organized by the Ministry of Environmental Protection Science and Technology Standards Division.

The main drafting unit of this standard. Gansu Province Environmental Monitoring Center Station.

The standard unit. Xiamen University School of Chemistry and Chemical Engineering, Guangzhou University Analysis and Testing Center, Chinese Academy of Sciences ecological ring Environmental Research Center, State Key Laboratory of Cryospheric Science, Chinese Academy of Sciences, Environmental Monitoring Station, Hulunbeier City,

Inner Mongolia, Guangdong Environmental Protection Engineering Vocational College and Gansu Jiayuguan City Environmental Protection Monitoring Station.

The environmental protection department of this standard approved on May 13, 2016.

This standard has been implemented since August 1, 2016.

This standard is explained by the Ministry of Environmental Protection.

Water-soluble cations in ambient air particulates (Li, Na, NH₄, K, Ca₂, Mg₂) was determined by ion chromatography

1 Scope of application

This standard specifies the determination of water-soluble inorganic cations in ambient air particulates (Li, Na, NH₄, K, Ca₂, Mg₂) by ion chromatography.

This standard applies to environmental air particles (including TSP, PM₁₀, PM_{2.5}, dust, etc.) in the six kinds of water-soluble cation (Li, Na, NH₄, K, Ca₂, Mg₂).

The ambient air particulate filter sample, when the sample volume is 60 m³ (standard state), the volume of the extract is 100 ml, when the volume was 25 µl, the detection limit of this method was 0.005 µg/m³ ~ 0.037 µg/m³, and the lower limit of determination was 0.020 µg/m³ ~ 0.148 µg/m³; dust samples, when the sampling volume of 0.100 g, the volume of 100 ml extract, injection volume of 25 µl, the the detection limit was 0.003 mg/g to 0.022 mg/g and the lower limit was 0.012 mg/g to 0.088 mg/g. See Appendix A. for details.

Note 1: This method is also applicable to the analysis of samples collected from special particles such as dust aerosols and dust storms in special weather.

2 Normative reference documents

The contents of this standard refer to the following documents or their terms. Those who do not specify the date of the reference file, the effective version of the appropriate for this standard.

Ambient air - Determination of dust emission - Gravimetric method GB/T Ambient air - Determination of total suspended particulates - Gravimetric method GB/T Technical Requirements and Test Methods for HJ 93 Environmental Air Particulate (PM₁₀ and PM_{2.5}) Sampler Determination of ambient air PM₁₀ and PM_{2.5} by HJ 618 Technical specification for manual monitoring of ambient air quality Technical Requirements and Test Methods for HJ/T 374 Total Suspended Particulate Sampler Technical Requirements and Testing Methods for Environmental Air Sampler of HJ/T 375

3 Terms and definitions

The following terms and definitions apply to this standard.

3.1 Ambient air particles

Through the sampling device, collected in the filter on the ambient air particles (including TSP, PM10, PM2.5, etc.), or through Dust collectors and other collection devices to collect the ambient air dust.

3.2 Water-soluble inorganic cations

A sample of ambient air particles that is dissolved in deionized water without the addition of a chemical reagent. Determination of this method the cations include Li, Na, NH₄, K, Ca²⁺, Mg²⁺.

4 Principle of the method

Collected samples of ambient air particulate matter, extracted with deionized water, cationic column exchange separation, with inhibition Type or non-suppression type conductivity detector detection. According to the retention time qualitative, peak height or peak area quantification.

5 Interference and elimination

Two kinds of cations with similar retention times, when their concentration difference is large and affect the determination of low concentration of ions, Release, adjust the flow rate, change the eluent ratio, etc. to eliminate interference.

6 Reagents and materials

Unless otherwise stated, analytical reagents conforming to national standards are used for analysis. The test water is a resistivity $\geq 18 \text{ Mohm} \cdot \text{cm}$ (25 °C) and filtered through a 0.45 μm microporous membrane.

6.1

concentrated nitric acid (HNO₃). excellent grade pure, $\rho = 1.42 \text{ g/ml}$.

6.2

lithium nitrate (LiNO₃). excellent grade, should be used before the $105 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$ dry constant weight, placed in a dryer to save.

6.3

sodium nitrate (NaNO_3). excellent grade, should be used before the $105\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$ dry constant weight, placed in a dryer to save.

6.4

ammonium chloride (NH_4Cl). excellent grade, should be used before the $105\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$ dry constant weight, placed in a dryer to save.

6.5

potassium nitrate (KNO_3). excellent grade, should be used before the $105\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$ dry constant weight, placed in a dryer to save.

6.6

calcium nitrate [$\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$]. excellent grade, should be placed in the dryer before the balance 24 h.

6.7

Magnesium nitrate [$\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$]. excellent grade, should be placed in the dryer before use for 24 h.

6.8

Methanesulfonic acid. omega ($\text{CH}_3\text{SO}_3\text{H}$) $\geq 99\%$.

6.9

Nitric acid solution. $c(\text{HNO}_3) = 1\text{ mol/L}$.

Remove 68.26 ml of concentrated nitric acid (6.1) slowly adding water, dilute to 1000 ml with water and mix well.

6.10

Lithium ion standard stock solution. $\rho(\text{Li}) = 1000\text{ mg/L}$.

Weigh 9.9337 g of lithium nitrate (6.2) dissolved in the amount of water, the whole volume into the 1000 ml volumetric flask, diluted with water volume to the standard Line, mix well. Transferred to the polyethylene bottle, in the $4\text{ }^\circ\text{C}$ below the cold, dark and sealed can be stored for 6 months. You can also buy commercially available Standard material.

6.11

sodium ion standard stock solution. $\rho(\text{Na}) = 1000\text{ mg/L}$.

Weigh 3.6977 g sodium nitrate (6.3) dissolved in the amount of water, the whole volume into the 1000 ml volumetric flask, diluted with water volume to the standard Line, mix well. Transferred to the polyethylene bottle, in the $4\text{ }^\circ\text{C}$ below the cold, dark and sealed can be stored for 6 months. You can also buy commercially available Standard material.