

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

HJ 1004-2018

**Ambient air - Determination of organic acids (acetate, formate
and oxalate) in precipitation - Ion chromatography**

环境空气 降水中有机酸（乙酸、甲酸和草酸）的测定 离子色谱法
(English Translation)

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Foreword

To protect the "Environmental Protection Law of the People's Republic of China" and the "Air Pollution Control Law of the People's Republic of China" the environment, to ensure human health, to regulate the determination method of organic acids (acetic acid, formic acid and oxalic acid) in precipitation, and to develop this standard.

This standard specifies ion chromatography for the determination of organic acids (acetic acid, formic acid and oxalic acid) in precipitation.

Appendix A and Appendix B of this standard are informative annexes.

This standard is the first release.

This standard is formulated by the Department of Eco-Environmental Monitoring, the Department of Regulations and Standards of the Ministry of Ecology and Environment.

This standard was drafted. China Environmental Monitoring Station.

This standard is verified by. Liaoning Provincial Environmental Monitoring Experimental Center, Inner Mongolia Autonomous Region Environmental Monitoring Center Station, Taiyuan City Ring Environmental Monitoring Center Station, Yangzhou Environmental Monitoring Center Station, Zhanjiang Environmental Protection Monitoring Station and Environmental Monitoring in Shapingba District, Chongqing station.

This standard is approved by the Ministry of Ecology and Environment on December 26, 2018.

This standard has been implemented since June 1, 2019.

This standard is explained by the Ministry of Ecology and Environment.

1 Determination of organic acids (acetic acid, formic acid and oxalic acid) in ambient air precipitation Ion chromatography Warning. Chemical reagents such as sodium hydroxide used in the experiment are highly corrosive, and formic acid and acetic acid standards have Volatile, reagent preparation process should be carried out in a fume hood; protective equipment should be worn as required to avoid breathing inhalation Road or contact with skin and clothing.

1 Scope of application

This standard specifies ion chromatography for the determination of organic acids (acetic acid, formic acid and oxalic acid) in precipitation.

This standard applies to the determination of three organic acids (acetic acid, formic acid and oxalic acid) in precipitation.

When the injection volume is 200 µl, the detection limits of acetic acid, formic acid and oxalic acid are 0.005 mg/L and 0.004 mg/L, respectively.

And 0.005 mg/L, the lower limit of determination is 0.020 mg/L, 0.016 mg/L and 0.020 mg/L, respectively.

2 Normative references

This standard refers to the following documents or their terms. For undated references, the valid version applies to this standard.

GB 13580.2 Collection and preservation of atmospheric precipitation samples HJ/T 165 acid deposition monitoring technical specification

3 Principle of the method

The target compound in the precipitation sample is separated from the eluent by the eluent, and after being detected by the conductivity detector, Leave time to characterize, peak area or peak height.

4 Interference and elimination

The retention time of fluoride ion and acetic acid is similar, and it is not easy to separate effectively. It is necessary to select an ion chromatography column with strong hydrophilicity of the filler.

And appropriately reduce the eluent concentration.

5 Reagents and materials

Unless otherwise stated, the analysis uses the pure grade reagents that meet the national standards, and the experimental water does not contain the target compound.

And deionized water with a resistivity of $\geq 18.2 \text{ Mohm}\cdot\text{cm}$ (25°C).

5.1

sodium hydroxide (NaOH).

5.2

Sodium carbonate (Na₂CO₃).

2 It should be dried at $105\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ for 2 h before use and stored in a desiccator.

5.3

Sodium bicarbonate (NaHCO₃).

Balance in the desiccator for 24 h before use.

5.4

Acetic acid. w (C₂H₄O₂) $\geq 99.5\%$.

5.5

Formic acid. w (CH₂O₂) $\geq 99.6\%$.

5.6

anhydrous sodium oxalate. w (Na₂C₂O₄) $\geq 99.5\%$, stored in a desiccator.

5.7

Sodium hydroxide solution. rho (NaOH) = 40 g/L.

Weigh 1 g of sodium hydroxide (5.1) and dissolve it to 25 ml with water.

5.8

acetic acid standard stock solution. rho (C₂H₄O₂) = 1000 mg/L.

Accurately remove 0.950 ml of acetic acid (5.4), dissolve in a small amount of water, transfer to a 1000 ml volumetric flask, dilute to volume with water until the mark is transferred to the reagent bottle and refrigerated at 4 ° C or less for two months. A commercially available certified standard solution can also be purchased.

5.9

Formic acid standard stock solution. rho(CH₂O₂)=1000 mg/L.

Accurately transfer 0.820 ml of formic acid (5.5), dissolve in a small amount of water, transfer to a 1000 ml volumetric flask, dilute to volume with water until the mark is

transferred to the reagent bottle and refrigerated at 4 ° C or less for two months. A commercially available certified standard solution can also be purchased.

5.10

Standard stock solution of oxalic acid. $\rho(\text{H}_2\text{C}_2\text{O}_4)=1000 \text{ mg/L}$.

Accurately weigh 0.4187 g of anhydrous sodium oxalate (5.6), dissolve it in a small amount of water, transfer it to a 250 ml volumetric flask, and dilute with water.

Allow to the mark, transfer to the reagent bottle, refrigerate below 4 °C, can be stored for two months. A commercially available certified standard solution can also be purchased.

5.11 Mixed standard use solution. $\rho(\text{C}_2\text{H}_4\text{O}_2)=10.0 \text{ mg/L}$, $\rho(\text{CH}_2\text{O}_2)=5.00 \text{ mg/L}$, $\rho(\text{H}_2\text{C}_2\text{O}_4)$

$=10.0 \text{ mg/L}$.

Accurately transfer 1.00 ml of acetic acid standard stock solution (5.8), 0.500 ml formic acid standard stock solution (5.9) and 1.00 ml Oxalic acid standard stock solution (5.10) in a 100 ml volumetric flask, dilute to volume with water and transfer to a reagent bottle, 4 ° C Stored in the following refrigerated storage for 7 days.

5.12 Carbonate eluent. $c(\text{Na}_2\text{CO}_3) = 4.0 \text{ mmol/L}$, $c(\text{NaHCO}_3) = 1.2 \text{ mmol/L}$.

Accurately weigh 0.8480 g of sodium carbonate (5.2) and 0.2016 g of sodium bicarbonate (5.3), dissolve in an appropriate amount of water and transfer to 2000 ml.

Volumetric flask, dilute to volume with water and mix.

Note: The eluent can also be prepared according to the instrument model and column instructions.

5.13 Microporous membrane. 0.45 μm pore size, made of polyethersulfone or hydrophilic polytetrafluoroethylene (hydrophilic PTFE).

6 Instruments and equipment

6.1

Ion Chromatograph. with conductivity detector, suppressor.

6.2

Anion column. 250 mm long, 4 mm inner diameter, polystyrene/divinylbenzene or polyvinyl alcohol.

A functional group such as an alkyl quaternary ammonium or an alkanol quaternary ammonium is bonded to the corresponding anion guard column. Or other equivalent column.