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Plastics — Ion exchange resin —

Part 1: Determination of exchange capacity of acrylic anion exchange resins

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Contents

Page

Foreword

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This document was prepared by Technical Committee ISO/TC 61, *Plastics,* Subcommittee SC 5, *Physical-chemical properties*.

A list of all parts in the ISO 4907 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Following the traditional chemical processes such as distillation and extraction, ion exchange and adsorption technology has also become a typical chemical separation technology, which plays an important role in efficient extraction, concentration and refining. Since the realization of organic synthesis, ion exchange resin has become one of the key materials for exchange and adsorption. At present, they have been widely used in water treatment, environmental protection, petrochemical industry, food and medicine, hydrometallurgy and energy industry, almost involving the core content of the United Nations Sustainable Development Goals (SDGs).

Ion exchange resin is a kind of high polymer organic copolymer, which is composed of insoluble three-dimensional space network framework, functional groups connected to the framework and exchangeable ions with opposite charges. The main features determined by the structure are exchangeable, selective, adsorbable and catalytic. However, even the same resin has different properties in different forms, such as exchange capacity and water content, so a unified method is needed to provide basis for manufacturing, quality supervision, technical exchange, factory inspection and arbitration.

Because of the special structure, acrylic anion exchange resins contain not only strong-base and weak-base groups, but also weak-acid groups, and the content of weak-acid groups directly affects the using effect. This document specifies how to determine the exchange capacity of acrylic anion exchange resins.

Plastics — Ion exchange resin —

Part 1: Determination of exchange capacity of acrylic anion exchange resins

1 Scope

This document specifies test methods of the strong-base group capacity, the weak-base group capacity and the weak-acid group capacity of acrylic anion exchange resins.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
standard form acrylic anion exchange resin
ionic type of the samples treated under the pretreatment and transformation conditions specified in this document

3.2
strong-base group capacity
quantity of active groups in *standard form acrylic anion exchange resin* (3.1) that can exchange with neutral salts under the conditions specified in this document

Note 1 to entry: It is expressed in millimoles of per gram or moles per litre (mol/l) of acrylic anion exchange resins.

3.3
weak-base group capacity
quantity of active groups in *standard form acrylic anion exchange resin* (3.1) that can exchange with acids under the conditions specified in this document

Note 1 to entry: It is expressed in millimoles of per gram or moles per litre (mol/l) of acrylic anion exchange resins.

3.4
weak-acid group capacity
quantity of active groups in *standard form acrylic anion exchange resins* (3.1) that can exchange with alkali under the conditions specified in this document

Note 1 to entry: It is expressed in millimoles of per gram or in moles per litre (mol/l) of acrylic anion exchange resins.

4 Principle

According to the definitions, strong-base group in acrylic anion exchange resins has the ability to split neutral salts, while weak-base groups and weak-acid groups have not.

Calculate the strong-base group capacity by the exchanged chloride ion contents in titration, when the standard form acrylic anion exchange resins react with neutral salts (such as sodium nitrate solution).

The reaction formula is:

$$R-\begin{cases}\mathrm{CH_2N(CH_3)_3\,Cl}\\ \mathrm{CH_2N(CH_3)H_2}\\ \mathrm{CH_2COOH}\end{cases}+\mathrm{NaNO_3}\rightarrow R-\begin{cases}\mathrm{CH_2N(CH_3)_3\,NO_3}\\ \mathrm{CH_2N(CH_3)H_2}\\ \mathrm{CH_2COOH}\end{cases}+\mathrm{NaCl}$$

Calculate the weak-base groups capacity by the unreacted acid contents in titration, when the standard form acrylic anion exchange resins react with excessive monobasic acid solution (such as hydrochloric acid).

The reaction formula is:

$$R-\begin{cases}\mathrm{CH_2N(CH_3)_3\,Cl}\\ \mathrm{CH_2N(CH_3)H_2}\\ \mathrm{CH_2COOH}\end{cases}+\mathrm{HCl}\rightarrow R-\begin{cases}\mathrm{CH_2N(CH_3)_3\,Cl}\\ \mathrm{CH_2N(CH_3)H_2HCl}\\ \mathrm{CH_2COOH}\end{cases}$$

Calculate the weak-acid group capacity by the unreacted alkali and the exchanged chloride ion contents in titration, when the standard form acrylic anion exchange resins react with excessive monobasic solution (such as sodium hydroxide).

The reaction formula is:

$$R-\begin{cases}\mathrm{CH_2N(CH_3)_3\,Cl}\\ \mathrm{CH_2N(CH_3)H_2}\\ \mathrm{CH_2COOH}\end{cases}+\mathrm{NaOH}\rightarrow R-\begin{cases}\mathrm{CH_2N(CH_3)_3\,OH}\\ \mathrm{CH_2N(CH_3)H_2}\\ \mathrm{CH_2COONa}\end{cases}+\mathrm{H_2O}+\mathrm{NaCl}$$

5 Reagents

WARNING — Reagents used in this document can have potential hazards to human health and the environment. Ensure that the instructions for the use of reagents are strictly followed.

Unless otherwise indicated, the reagents specified in this document should be analytical grade.

Commercially available, ready-made solutions may be used.

5.1 Water, grade 2 in accordance with ISO 3696.

5.2 Sodium hydroxide, standard solution, $c(\mathrm{NaOH}) \approx 0{,}10$ mol/l.

Dissolve 4 g of sodium hydroxide to 1 000 ml with water. Calibrate this solution at least weekly as follows.

5.2.1 Calibration

Dry 10 g of potassium hydrogen phthalate ($KHC_8H_4O_4$, Guaranteed Reagent) at 105 °C to 110 °C for 4 h. And then cool to room temperature in a desiccator.

Weigh 0,75 g of potassium hydrogen phthalate (m_1) to the nearest 0,001 g, and dissolve with 100 ml of water in a flask. Add 0,1 ml of phenolphthalein indicator solution. Titrate with 0,10 mol/l sodium hydroxide solution (5.2) until the pink colour appears and persists for 15 s. Record the consumption volume of alkali (V_1).

5.2.2 Blank determination

Pipet 100 ml of water. Carry out a blank determination according to the procedure 5.2.1. Record the consumption volume of alkali (V_2).

5.2.3 Calculation

See Formula (1):

$$c(\text{NaOH}) = \frac{1\,000 \times m_1}{204{,}220 \times (V_1 - V_2)} \qquad (1)$$

where

$c(\text{NaOH})$	is the actual concentration, expressed in moles per litre (mol/l), of the sodium hydroxid solution;
m_1	is the mass, expressed in grams (g), of potassium hydrogen phthalate;
V_1	is the titration consumption volume, expressed in millilitres (ml), of the sodium hydroxide solution;
V_2	is the blank consumption volume, expressed in millilitres (ml), of the sodium hydroxide solution.

5.3 **Hydrochloric acid,** standard solution, $c(\text{HCl}) \approx 0{,}10$ mol/l.

Dilute 9 ml of hydrochloric acid (1,19 g/ml) to 1 000 ml with water. Calibrate this solution at least weekly as follows.

5.3.1 Calibration

Dry 5 g of sodium carbonate (Na_2CO_3, Guaranteed Reagent) at 270 °C to 300 °C for 4 h. And then cool to room temperature in a desiccator.

Weigh 0,2 g of sodium carbonate (m_2) to the nearest 0,001 g, and dissolve with 100 ml water in a flask. Add 0,1 ml of bromocresol green-methyl red indicator solution. Titrate with 0,1 mol/l hydrochloric acid solution (5.3) until the greenish-blue colour disappears. Record the consumption volume of acid (V_3).

5.3.2 Blank determination

Pipet 100 ml of water. Carry out a blank determination according to the appropriate procedure 5.3.1. Record the consumption volume of acid (V_4).

5.3.3 Calculation

See Formula (2):

$$c(\mathrm{HCl})=\frac{1\,000\times m_2}{52{,}994\times(V_3\text{-}V_4)} \tag{2}$$

where

$c(\mathrm{HCl})$	is the actual concentration, expressed in moles per litre (mol/l), of the hydrochloric acid solution;
m_2	is the mass, expressed in grams (g), expressed of sodium carbonate;
V_3	is the titration consumption volume, expressed in millilitres (ml), of hydrochloric acid solution;
V_4	is the blank consumption volume, expressed in millilitres (ml), of hydrochloric acid solution.

5.4 Silver nitrate, standard solution, $c(AgNO_3) \approx 0{,}10$ mol/l.

Dissolve 17,5 g of silver nitrate to 1 000 ml with water. Store in an amber glass bottle. Calibrate this solution at least weekly as follows.

5.4.1 Calibration

Dry 5 g of sodium chloride (NaCl, Guaranteed Reagent) at 500 °C for 10 min. And then cool to room temperature in a desiccator.

Weigh 1,649 g of sodium chloride (m_3) to the nearest 0,001 g, and dissolve to 1 000 ml with water.

Pipet 10 ml of sodium chloride solution in a flask, and add 90 ml water and 1 ml of 10 % potassium chromate indicator. Titrate with 0,1 mol/l silver nitrate standard solution (5.4) until the colour changes to brick-red and persists for 15 s. Record the consumption volume of the silver nitrate standard solution (V_5).

5.4.2 Blank determination

Pipet 100 ml of water. Carry out a blank determination according to the appropriate procedure 5.4.1 and record the consumption volume of the silver nitrate standard solution (V_6).

5.4.3 Calculation

See Formula (3):

$$c(\mathrm{AgNO_3})=\frac{1\,000\times m_3}{58{,}442\times(V_5\text{-}V_6)} \tag{3}$$

where

$c(AgNO_3)$	is the actual concentration, expressed in moles per litre (mol/l), of the silver nitrate standard solution;
m_3	is the mass, expressed in grams (g), of sodium chloride;
V_5	is the titration consumption volume, expressed in millilitres (ml), of the silver nitrate standard solution;

V_6 is the blank consumption volume, expressed in millilitres (ml), of the silver nitrate standard solution.

5.5 Sodium nitrate solution, $c(NaNO_3)$ = 1 mol/l.

Dissolve 85 g of sodium nitrate to 1 000 ml with water.

5.6 Sodium hydroxide solution, $c(NaOH)$ = 1 mol/l.

Dissolve 40 g of sodium hydroxide to 1 000 ml with water.

5.7 Hydrochloric acid solution, $c(HCl)$ = 1 mol/l.

Dilute 90 ml of hydrochloric acid (1,19 g/ml) to 1 000 ml with water.

5.8 Ammonia-ammonium chloride solution (pH = 9,25 ± 0,15).

Dissolve 53 g of ammonium chloride and 67 ml of ammonia to 1 000 ml with water, adjust the solution to pH = 9,25 ± 0,15.

5.9 Methyl red-methylene blue mixed indicator solution.

Dissolve 0,1 g of methyl red and 0,1 g of methylene blue in 100 ml of ethanol [a volume fraction of ≥90 % ethanol], respectively. Mix the above solutions in equal volumes. Store in an amber glass bottle.

5.10 Potassium chromate indicator.

Dissolve 10 g of potassium chromate to 100 ml with water. Store in an amber glass bottle.

5.11 Nitric acid (1 + 9, volume fraction).

Mix 100 ml of nitric acid (1,42 g/ml, Guaranteed Reagent) and 900 ml of water together.

5.12 Silver nitrate solution indicator.

Dissolve 5 g of silver nitrate to 100 ml with water. Store in an amber glass bottle.

5.13 Phenolphthalein indicator.

Dissolve 1,0 g of phenolphthalein in ethanol [a volume fraction of ≥90 % ethanol] and dilute to 100 ml.

5.14 Bromocresol green-methyl red indicator solution.

Dissolve 0,2 g of bromocresol green and 0,015 g of methyl red in 100 ml of ethanol [a volume fraction of ≥90 % ethanol]. Store in an amber glass bottle.

5.15 Sodium chloride solution, $c(NaCl)$ = 10 %.

Dissolve 100 g of sodium chloride to 1 000 ml with water.

NOTE According to titration (GM 31.2) in ISO 6353-1, automatic potentiometric apparatus can also be used as an alternative. Select equivalence point of the acid-base titration by pH electrode as the endpoints, or equivalence point of the chloridion content titration by silver electrode as the endpoints.

6 Apparatus

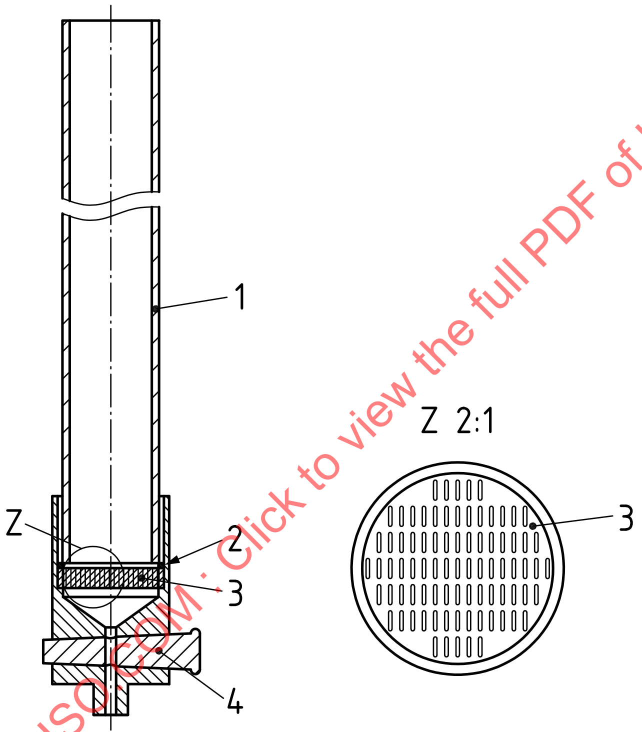
WARNING — Apparatus used in this document can have potential hazards to human health and the environment. Ensure that the instructions for the use of apparatus are strictly followed.

Usual laboratory equipment and, in particular, the following should be used.

6.1 Exchange column (see Figure 1), internal diameter $\phi \geq 20$ mm.

6.2 Centrifugal filter tube (see Figure 2), internal diameter $\phi \geq 30$ mm.

6.3 Centrifuge, maximum adjustable speed: 5 000 r/min (523 rad/s), the accuracy is below ±200 r/min (21 rad/s); Max RCF: about 4 400 × g; Time adjustable range: higher than 5 min, the accuracy is ±2 s; capacity: 4 × 100 ml.



Key

1 exchange column

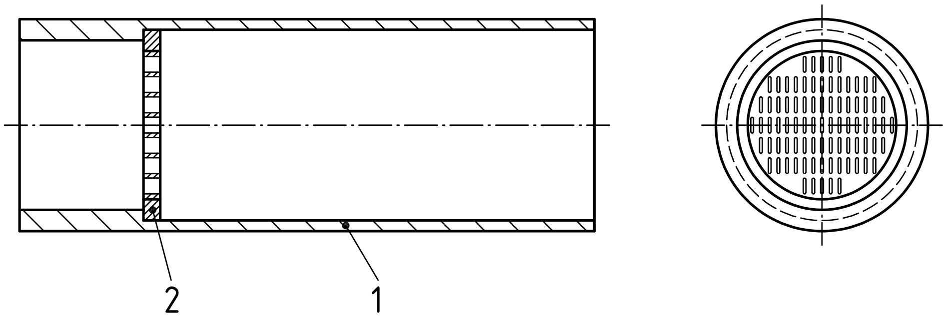
2 rubber washer

Z partial zoom, the ratio is 2:1

3 filter plate

4 cock plug

Figure 1 — Structure of exchange column



Key

1 centrifugal filter tube

2 filter plate

Figure 2 — Structure of centrifugal filter tube

7 Samples

7.1 Sampling

Obtain a representative sample of the ion exchange resins in accordance with Annex A.

7.2 Sample preparation

Transfer 50 ml of samples to the glass exchange column (6.1), then backwash with water, where the expansion rate of the sample is 50 % to 100 %, until the effluent is clear and no visible impurities. The resins are allowed to settle freely and drain until the liquid level is about 20 mm higher than the resin.

Treat the resin according to the requirements in Table 1.

Contain 20 mm layer of liquid above the resins bed and ensure no bubbles throughout the process. Maintain the temperature of the water and all pretreatment solutions at (25 ± 10) °C.

Transfer and store the treated sample into a clean wide-mouth bottle for use.

Table 1 — Treatment of acrylic anion exchange resins

Solution	Volume ml	Time min
HCl (5.7) or NaCl (5.15)	250	30 to 40
Water	250	20 to 30
NaOH (5.6)	250	30 to 40
Water	250	20 to 30
HCl (5.7)	300	30 to 40
Water	250	20 to 30
Ammonia-ammonium chloride solution (5.8)	400	up to 60
Water	Maintain a flow rate of 7 ml/min and wash the resins until 5 ml of the effluent remains colourless with the addition of the phenolphthalein indicator, and free of white precipitate with the addition of silver nitrate.	

8 Procedure

8.1 Removal of the external water

Transfer the sample (7.2) to the centrifugal filter tubes with water, and let them stand until no water runs out, and then place them into the centrifuge. Set the centrifuge speed of 2 500 r/min (262 rad/s) for 5 min, and start the centrifuge to remove external water.

After the centrifuge completely stops, take out the centrifugal filter tubes, wipe the bottom and external moisture of the filter tubes with filter paper, and then pour the sample into a pre-dried weighing bottle, cover tightly for later use.

NOTE Take care of the balance of centrifuge during working.

8.2 Water content

Determine the water content of the ion exchange resins in accordance with Annex B.

8.3 Strong-base group capacity

Weigh 1 g to 8 g of sample (8.1) (m_4), with recommendation of 1 g to 2 g, to the nearest 0,001 g and transfer into dry plugged bottle.

Transfer 1 000 ml of 1 mol/l sodium nitrate solution into the bottle, stopper tightly and shake well, and place at room temperature for 1 h.

Pipet 100 ml of soaking solution to a bottle, add 1 ml of potassium chromate indicator and titrate with 0,1 mol/l silver nitrate standard solution (5.4) until the color changes to brick-red and persists for 15 s. Record the consumption volume of the silver nitrate standard solution (5.4) (V_7).

Conduct a titration blank experiment by pipetting 100 ml of 1 mol/l sodium nitrate solution. Record the consumption volume of the silver nitrate standard solution (5.4) (V_8).

8.4 Weak-base group capacity

Weigh 1 g to 8 g of sample (8.1) (m_5), with recommendation of 1 g to 2 g, to the nearest 0,001 g and transfer into dry plugged bottle.

Transfer 1 000 ml of 1 mol/l hydrochloric acid standard solution (5.3) into the bottle, stopper tightly and shake well, and place at room temperature for 2 h.

Pipet 25 ml of soaking solution to a bottle, and then add 0,1 ml of methyl red-methylene blue mixed indicator. Titrate with sodium hydroxide standard solution (5.2) until the colour changes to green and persists for 15 s. Record the consumption volume of the sodium hydroxide standard solution (5.2) (V_9).

Conduct a titration blank experiment by pipetting 25 ml of 0,1 mol/l hydrochloric acid standard solution (5.3). Record the consumption volume of the sodium hydroxide standard solution (5.2) (V_{10}).

8.5 Weak-acid group capacity

Weigh 2,5 g to 8 g of sample (8.1) (m_6) to the nearest 0,001 g and transfer into dry plugged bottle.

Pipet 100 ml of 0,1 mol/l sodium hydroxide standard solution (5.2) into the bottle, stopper tightly and shake well, and place at room temperature for 3 h.

Pipet 25 ml of soaking solution to a bottle, and then add 0,1 ml of methyl red-methylene blue mixed indicator. Titrate with 0,1 mol/l hydrochloric acid standard solution (5.3) until the colour changes to purple and persists for 15 s. Record the consumption volume of the hydrochloric acid standard solution (5.3) (V_{11}). Conduct a titration blank experiment by pipetting 25 ml of 0,1 mol/l sodium hydroxide standard solution (5.2). Record the consumption volume of hydrochloric acid standard solution (5.3) (V_{12}).

Pipet 25 ml of soaking solution to a bottle, and then add 0,1 ml of phenolphthalein indicator. Add nitric acid solution (1 + 9) dropwise slowly until the solution is colourless. Add 1 ml of potassium chromate indicator and titrate with 0,1 mol/l silver nitrate standard solution (5.4) until the colour changes to brick-red and persists for 15 s. Record the consumption volume of silver nitrate standard solution (5.4) (V_{13}). Conduct a titration blank experiment by pipetting 25 ml of 0,1 mol/l sodium hydroxide standard solution (5.2). Record the consumption volume of silver nitrate standard solution (5.4) (V_{14}).

NOTE 1 Avoid resins particles being sucked out when pipetting soaking solution.

NOTE 2 According to titration (GM 31.2) in ISO 6353-1, automatic potentiometric apparatus can also be used as an alternative. Select equivalence point of the acid-base titration by pH electrode as the endpoints, or equivalence point of the chloridion content titration by silver electrode as the endpoints.

9 Calculation

9.1 Strong-base group capacity

Calculate the strong-base group capacity according to Formula (4) or (5):

$$Q_1 = 10 \times \frac{c(\mathrm{AgNO_3}) \times (V_7 - V_8)}{m_4 \times (1 - X)} \tag{4}$$

$$Q_{V1} = 10 \times \frac{c(AgNO_3) \times (V_7 - V_8)}{\mathrm{m}_4} \times d_b \tag{5}$$

where

Q_1	is the strong-base group capacity, expressed in millimoles per gram (mmol/g) (dry), of resins sample;
$c(\mathrm{AgNO_3})$	is the concentration, expressed in moles per gram (mol/g), of silver nitrate standard solution;
V_7	is the titration consumption volume, expressed in millilitres (ml), of silver nitrate standard solution;
V_8	is the blank consumption volume, expressed in millilitres (ml), of silver nitrate standard solution;
m_4	is the mass, expressed in gram (g), of resins sample;
X	is the water content, expressed in percent (%), of resins sample;
Q_{V1}	is the strong-base group volume exchange capacity, expressed in moles per litre (mol/l), of resins sample;
d_b	is the wet apparent density, expressed in gram per millilitres (g/ml), of resins sample in compacted and wet state.

9.2 Weak-base group capacity

Calculate the weak-base group capacity according to Formula (6) or (7):

$$Q_2 = 40 \times \frac{\mathrm{c(NaOH)} \times (V_{10} - V_9)}{m_5 \times (1 - X)} \tag{6}$$

$$Q_{V2} = 10 \times \frac{c(NaOH) \times (V_{10} - V_9)}{m_5} \times d_b \quad (7)$$

where

Q_2	is the weak-base group capacity, expressed in millimoles per gram (mmol/g) (dry), of resins sample;
c(NaOH)	is the concentration, expressed in moles per gram (mol/g), of sodium hydroxide standard solution;
V_9	is the titration consumption volume, expressed in millilitres (ml), of sodium hydroxide standard solution;
V_{10}	is the blank consumption volume, expressed in millilitres (ml), of sodium hydroxide standard solution;
m_5	is the mass, expressed in gram (g), of resins sample;
X	is the water content, expressed in percent (%), of resins sample;
Q_{V2}	is the weak-base group volume exchange capacity, expressed in moles per liter (mol/l), of resins sample;
d_b	is the wet apparent density, expressed in gram per millilitres (g/ml), of resins sample in compacted and wet state.

9.3 Weak-acid group capacity

Calculate the weak-acid group capacity according to Formula (8) or (9):

$$Q_3 = 4 \times \frac{c(HCl) \times (V_{12} - V_{11}) - c(AgNO3) \times (V_{13} - V_{14})}{m_6 \times (1 - X)} \quad (8)$$

$$Q_{V3} = 4 \times \frac{c(HCl) \times (V_{12} - V_{11}) - c(AgNO3) \times (V_{13} - V_{14})}{m_6} \times d_b \quad (9)$$

where

Q_3	is the weak-acid group capacity, expressed in millimoles per gram (mmol/g) (dry), of resins sample;
c(HCl)	is the concentration, expressed in moles per gram (mol/g), of hydrochloric acid standard solution;
V_{11}	is the titration consumption volume, expressed in millilitres (ml), of hydrochloric acid standard solution;
V_{12}	is the blank consumption volume, expressed in millilitres (ml), of hydrochloric acid standard solution;
$c(AgNO_3)$	is the concentration, expressed in moles per gram(mol/g), of silver nitrate standard solution;
V_{13}	is the titration consumption volume, expressed in millilitres (ml), of silver nitrate standard solution;

V_{14} is the blank consumption volume, expressed in millilitres (ml), of silver nitrate standard solution;

m_6 is the mass, expressed in gram (g), of resins sample;

X is the water content, expressed in percent (%), of resins sample;

Q_{V3} is the weak-acid group volume exchange capacity, expressed in moles per liter (mol/l), of resins sample;

d_b is the wet apparent density, expressed in gram per millilitres (g/ml), of resins sample in compacted and wet state.

10 Test report

The test report shall include the following particulars:

a) all information necessary to identify the test material;

b) a reference to this document; i.e. ISO 4907-1:2023;

c) the sampling method used;

d) the test method used;

e) the test results obtained or the final reference results obtained through repeatability test;

f) all operating details not specified in this document, or regarded as optional, and details of any incidents which may influence the test results;

g) any unusual features (anomalies) observed during the test;

h) the date of the test.

Annex A
(normative)

Sampling

A.1 Overview

This annex specifies sampling methods of the ion exchange resins.

A.2 Apparatus

A.2.1 Sampler

A.2.1.1 Material, stainless steel or plastic.

A.2.1.2 Structure

Internal diameter 25 mm to 30 mm, width 18 mm to 20 mm. The opening length shall not be less than 80 % of the height of the ion exchange resins layer, as shown in Figure A.1.

The total length of the sampler can be adjusted appropriately according to the height of the ion exchange resins layer in the container. Ensure that the opening section can reach the bottom of the container and the height is not less than 200 mm from the surface of the ion exchange resins layer to the rear end section.

NOTE The sampler can be segmented, which is convenient for sampling different height of ion exchange resins layer.

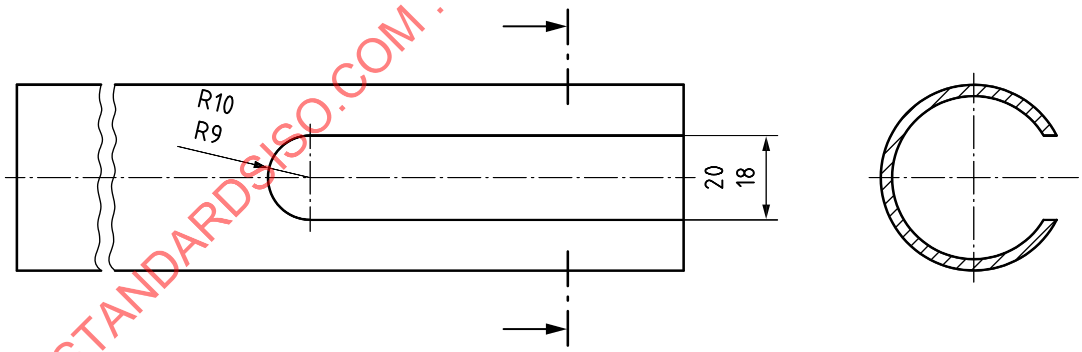


Figure A.1 — Sampler

A.2.2 Separator, clean and dry.

A.2.3 Container, clean and sealed.

A.3 Sampling rules

A.3.1 Sampling

When sampling from the production line, the unit of sampling shall be one kettle.

When samples are from the same batch and there are n packages, each package shall be sampled no less than 3 times when $n \leq 3$. When $n > 3$, random sampling method shall be adopted. The total number of samples shall be calculated according to the formula $\sqrt{n}+1$ (in the case of decimals, integer shall be taken by rounding method), and each shall be sampled no less than twice.

Samples are taken from the top, middle and bottom for an individual upright packages.

A.3.2 Volume

More than 1 l.

A.4 Procedure

A.4.1 Sampling

Open the package and insert the sampler vertically down into the bottom of the ion exchange resins layer at different parts.

To prevent the ion exchange resins from sliding down, the sampler shall be facing upwards and tilting at an angle of 15° to 20° from the perpendicular before pulling out. Then pour the sample into the storage container.

A.4.2 Division

Divide the sample by quartering until the required volume is obtained.

A.5 Storage

Seal in the sample storage container and store in a cool place.

A.6 Identification

The sample container shall include the following particulars:

a) name;

b) batch No.;

c) sampling spot;

d) sampling date;

e) signature of sampler.