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national standards of People's Republic of China

GB 18351-20XX Replace GB 18351-2017

Ethanol gasoline for vehicles

Ethanol gasoline for motor vehicles

(Draft for comments)

20XX-XX-XX released

20XX-XX-XX implementation

State Administration of Market Supervision and Administration National Standardization Management Committee

before Speak

This document was drafted in accordance with the rules given in GB/T 1.1.

This document replaces GB 18351-2017 "Ethanol Gasoline for Motor Vehicles (E10)".

Compared with GB 18351-2017, the main technical changes of this document are as follows:

----- Modify the name of the document to ethanol gasoline for vehicles;

------ Modify the scope of Chapter 1 to "This document specifies the terms and definitions, product classification, requirements and test methods of ethanol gasoline for vehicle: Law, sampling, marking, packaging, transportation and storage, safety and standard implementation. This document is applicable to the blending component oil of ethanol gasoline for Ethanol gasoline for vehicles composed of a certain amount of denatured fuel ethanol and performance-improving additives" (see Chapter 1, Chapter 1 of the 2017 edition);

----- Revise the normative references in Chapter 2 (see Chapter 2, Chapter 2 of the 2017 edition);

-----The terms and definitions of Chapter 3 Ethanol Gasoline Blending Component Oil, Auto Ethanol Gasoline (E5), and Ethanol Gasoline for Auto have been added (See Chapter 3, Chapter 3 of the 2017 edition);

------The product classification in Chapter 4 is revised to read "Ethanol gasoline for automobiles is classified into ethanol gasoline for automobiles according to the content of et (E10) and automobile ethanol gasoline (E5), automobile ethanol gasoline (E10) is divided into 89, 92, 95 and 98 according to the research octane number

According to the research octane number, four brands of ethanol gasoline (E5) are divided into four brands: 89, 92, 95 and 98 (see 4

Chapter, Chapter 4 of the 2017 Edition);

——Deleted the technical requirements and test methods of ethanol gasoline (E10) (V) for motor vehicles (Table 1 of the 2017 edition), and added ethanol gasoline for motor veh (E5) (VIA) and automotive ethanol gasoline (E5) (VIB) technical requirements and test methods (see Table 3, Table 4);

-----Modified footnotes b and c of vapor pressure (see Table 1, Table 2, Table A.1 in Appendix A, and Table 2, Table 3, and Appendix A of the 2017 edition

Table A.2);

----Deleted the technical requirements for unwashed gum content (before adding detergent) (see Table 1, Table 2, Table A.1 in Appendix A, 2017

Version Table 2, Table 3, Table A.2 in Appendix A);

-----Revised the sulfur content test method and arbitration method; (see Table 1, Table 2, Table A.1 in Appendix A, Table 2, Table 3,

Table A.2 in Appendix A);

-----The technical requirements and test methods for silicon content, chlorine content, methylal content, total content of aniline compounds have been added (see Table 1,

Table 2, Table A.1 in Appendix A, Table 2, Table 3 in the 2017 Edition, Table A.2 in Appendix A);

-----Article 5.5 was added, "Ethanol gasoline for vehicles sold on the market should be added with gasoline that meets the requirements of GB 19592 with a nominal dose or mon Oil detergent";

-----Modified the implementation of Chapter 9 standards (see Chapter 9, Chapter 9 of the 2017 edition);

-----Revised Appendix A (see Appendix A, Appendix A of the 2017 edition);

-----Appendix B has been added.

This document was proposed and managed by the National Energy Administration.

The previous versions of the standards replaced by this document are as follows:

— — GB18351-2001, GB18351-2004, GB18351-2010, GB18351-2013, GB18351-2015,

GB18351-2017.

Page 5

GB 18351-20XX

I

Ethanol gasoline for vehicles

Warning --- If proper precautions are not followed, the products in this document may be dangerous during production, storage, transportation, and use.

This document does not intend to make recommendations for all safety issues related to this product. Before using this standard, the user is responsible for establishing appropriate sa Comprehensive health measures, and determine the applicability of relevant regulatory restrictions.

1 Scope

This document specifies the terms and definitions, product classification, requirements and test methods, sampling, marking, packaging, and transportation of ethanol gasoline fi

Transportation and storage, safety and standard implementation

This document is applicable to vehicles with a certain amount of denatured fuel ethanol and performance-improving additives added to the vehicle ethanol gasoline blending cor Use ethanol gasoline.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this article

Pieces. For undated reference documents, the latest version (including all amendments) is applicable to this document.

GB 190 Dangerous Goods Packaging Mark

GB/T 259 Determination of water-soluble acids and bases of petroleum products

GB/T 503 Gasoline octane number determination motor method

GB/T 511 Determination of mechanical impurities in petroleum and petroleum products and additives

GB/T 1884 Laboratory Method for Determination of Density of Crude Oil and Liquid Petroleum Products (Densimeter Method)

GB/T 1885 Petroleum Meter

GB/T 4756 Manual sampling method for petroleum liquids

GB/T 5096 Petroleum products copper sheet corrosion test method

GB/T 5487 Research Method for the Determination of Gasoline Octane Number

GB/T 6536 Determination of atmospheric distillation characteristics of petroleum products

GB/T 8017 Determination of Vapor Pressure of Petroleum Products Reid Method

GB/T 8018 Gasoline Oxidation Stability Determination Induction Period Method

GB/T 8019 Determination of fuel colloid content by jet evaporation method

GB/T 8020 Determination of Lead in Gasoline by Atomic Absorption Spectrometry

GB/T 11132 Determination of Hydrocarbons in Liquid Petroleum Products Fluorescent Indicator Adsorption Method

GB/T 11140 Determination of Sulfur Content in Petroleum Products Wavelength Dispersive X-ray Fluorescence Spectrometry

GB 18350 Denatured fuel ethanol

GB 19592 gasoline detergent for vehicles

GB 22030 Ethanol gasoline blending component oil for vehicles

GB/T 28768 Determination of Hydrocarbon Composition and Oxygenated Compounds of Motor Gasoline Multidimensional Gas Chromatography Method GB 30000.7-2013 Chemical Classification and Labeling Specification Part 7: Flammable Liquid

Page 6

GB 18351-20XX

1

GB/T 30519 Light Petroleum Fractions and Products-Determination of Hydrocarbon Group Composition and Benzene-Multidimensional Gas Chromatography GB/T 33647 Determination of Silicon Content in Motor Gasoline Inductively Coupled Plasma Atomic Emission Spectrometry GB/T 33649 Determination of Oxygenated Compounds and Aniline Compounds in Motor Gasoline Gas Chromatography GB/T 34100 Determination of total sulfur content in light hydrocarbons, engine fuels and other oils by ultraviolet fluorescence method NB/SH/T 0164 Petroleum and related products packaging, storage, transportation and delivery acceptance rules NB/SH/T 0174 PhD test method for the inspection of mercaptans and other sulfides in petroleum products and hydrocarbon solvents SH/T 0246 Determination of water content in light petroleum products (electrical method) SH/T 0253 Determination of Total Sulfur in Light Petroleum Products (Coulometric Method) SH/T 0604 crude oil and petroleum products density determination method (U-shaped vibrating tube method) NB/SH/T 0663 Gasoline Determination of Alcohols and Ethers Content Gas Chromatography SH/T 0689 Determination of total sulfur content in light hydrocarbons, engine fuels and other oils (ultraviolet fluorescence method) SH/T 0693 Determination of Aromatics in Gasoline (Gas Chromatography) NB/SH/T 0711 Determination of Manganese in Gasoline Atomic Absorption Spectrometry SH/T 0712 Determination of Iron in Gasoline (Atomic Absorption Spectrometry) SH/T 0713 Determination of Benzene and Toluene in Motor Gasoline and Aviation Gasoline (Gas Chromatography) SH/T 0720 Determination of oxygenated compounds in gasoline (gas chromatography and oxygen selective flame ionization detector method) NB/SH/T 0741 Determination of Hydrocarbon Composition in Gasoline Multidimensional Gas Chromatography Method SH/T 0794 Determination of Vapor Pressure of Petroleum Products by Micro Method

NB/SH/T 0842 Determination of Sulfur Content in Light Liquid Fuels Single Wavelength Dispersive X-ray Fluorescence Spectrometry

NB/SH/T 0991 Determination of Aniline Compounds in Gasoline Gas Chromatography-Nitrogen Chemiluminescence Detection Method

NB/SH/T 0994-2019 Separation and Determination of Oxygen and Nitrogen Additives in Gasoline Solid Phase Extraction/Cas Chromatography-Mass Spectrometry

SH/T 1757 Determination of Organic Chlorine in Industrial Aromatic Hydrocarbons Microcoulometric Method

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

Antiknock index

One half of the sum of research octane number (RON) and motor octane number (MON)

[GB 17930-2016, definition 3.1]

3.2

Denatured fuel ethanol

Fuel ethanol that is not suitable for drinking after adding denaturant.

[GB 18350-2013, definition 3.3]

3.3

Blendstocks of ethanol gasoline for motor vehicles

The basic gasoline components used in blending ethanol gasoline for vehicles.

3.4

Ethanol gasoline for motor vehicles (E10)

2

Page 7

GB 18351-20XX

It is blended by adding 10% volume fraction of denatured fuel ethanol to the vehicle ethanol gasoline blending component oil and used as a vehicle ignition engine Machine fuel.

3.5

Ethanol gasoline for motor vehicles(E5)

It is blended by adding 5% volume fraction of denatured fuel ethanol to the vehicle ethanol gasoline blending component oil and used as a vehicle ignition engine

Fuel.

3.6

Ethanol gasoline for motor vehicles

The fuel blended by adding denatured fuel ethanol to vehicle ethanol gasoline blending component oil is used as fuel for vehicle ignition engine, including Ethanol gasoline for vehicles (E10) and ethanol gasoline (E5) for vehicles.

4 Product Classification

Vehicle ethanol gasoline is divided into vehicle ethanol gasoline (E10) and vehicle ethanol gasoline (E5) according to the ethanol content of the denatured fuel. Ethanol gasoline (E10) is divided into four brands: No. 89, No. 92, 95 and No. 98 according to the research octane number. Ethanol gasoline (E5) for vehicles is The research octane number is divided into four grades: 89, 92, 95 and 98.

5 Requirements and test methods

5.1 The additives used in vehicle ethanol gasoline should have no recognized harmful effects and should be used in the recommended appropriate amount. Ethanol gasoline for vehicle It should not contain any additives and pollutants that can cause the vehicle to fail to operate normally. Ethanol gasoline for vehicles must not be artificially added to methylal or benzy Amines and compounds containing halogen, phosphorus, silicon and other compounds.

5.2 Ethanol gasoline for vehicles should be blended component oil of ethanol gasoline for vehicles that meets GB 22030 and denatured fuel ethanol that meets GB 18350.

For vehicle ethanol gasoline (E10), the amount of denatured fuel ethanol added should meet the requirements of Table 1, Table 2 or Table A.1 in Appendix A; For vehicle ethanol gasoline (E5), the addition amount of denatured fuel ethanol should meet the requirements of Table 3, Table 4 or Table A.2 in Appendix A.

5.3 The technical requirements and test methods of ethanol gasoline (E10) (VIA) and (VIB) for vehicles of No. 89, No. 92 and No. 95 are shown in Table 1 and Table 1, respectively. 2. When an enterprise has the conditions to produce and sell ethanol gasoline (E10) (VIA)/(VIB) for No. 98 vehicles, its technical requirements should comply with Appendix A Table A.1.

5.4 The technical requirements and test methods of ethanol gasoline (E5) (VIA), (VIB) for vehicles No. 89, No. 92 and No. 95 are shown in Table 3 and Table 4 respectively. When an enterprise has the conditions to produce and sell ethanol gasoline (E5) (VIA)/(VIB) for No. 98 vehicles, its technical requirements should comply with Table A.2. in Appendi: 5.5 Ethanol gasoline for vehicles sold on the market should be added with a gasoline detergent that meets the requirements of GB 19592 above the nominal dose.

6 sampling

Sampling is carried out in accordance with GB/T 4756, and 4 L is used for inspection and retention. Avoid light when sampling.

7 Marking, packaging, transportation and storage

7.1 Marking, packaging, transportation and storage, and delivery acceptance shall be carried out in accordance with SH/T 0164, GB 30000.7-2013 and GB 190.

7.2 The fuel dispensers used for vehicle ethanol gasoline (E10) and vehicle ethanol gasoline (F5) that meet the requirements of this standard sold to users The name, brand and grade (VIA and VIB) of the product should be clearly marked. Such as: Ethanol gasoline (E10) (VIA) for car No. 92⁺, No. 95⁺ Ethanol gasoline for motor vehicles (E10) (VIB)⁺, "Ethanol gasoline for motor vehicles No. 95 (E5) (VIA)⁺, etc., and should be marked where consumers can see local.

7.3 Special pipelines, containers and pumps should be used for vehicle ethanol gasoline that meets this standard during transportation and storage. Have been transported in storage During the process, the entire system should be clean and free of water. If phase separation occurs, the separated water is sent to a special wastewater treatment plant for treatment.

Page 8

GB 18351-20XX

Note: The seals and materials of storage tanks, pumps, pipelines, and meters used during transportation and storage of vehicle ethanol gasoline should not affect product quality.

8 Security

According to GB 30000.7-2013, ethanol gasoline for vehicles is a flammable liquid. For its hazard and precautionary statements, see GB 30000.7-2013 Appendix D.

9 Implementation of the standard

This standard shall be implemented from the date of issuance, and implement the transition period requirements that are gradually introduced. Table 1, Table 3, Table A.1 and Tab The requirements for silicon content, chlorine content, methylal content and total content of aniline compounds shall be implemented from July 1, 2022; Table 2 and Table 4 The transitional period for the specified technical requirements is to December 31, 2022. Starting from January 1, 2023, the technical requirements specified in Table 1 and Table 3 will be only.

Taking into account the special needs of environmental protection in certain areas of the country, local governments can, in accordance with their environmental governance req After the consensus is reached, the technical requirements for ethanol gasoline for vehicles at the corresponding stage can be implemented in advance.

4

GB 18351-20XX

Table 1 Technical requirements and test methods for ethanol gasoline (E10) (VIA) for vehicles

	.,	τ.			Quality Index		
	item	Item		89	92	95	experiment method
Knock resistance:							
Research Octane 1	Number (RON	V)	not less than	89	92	95	GB/T 5487
Anti-knock index	(RON+MON	1)/2	not less than	84	87	90	GB/T 503, GB/T 5487
Lead content a /(g	/L)		no greater than		0.005		GB/T 8020
Distillation range:							
10% evaporati	on temperatu	ire/°C	not higher than		70		
50% evaporati	on temperatu	ire/°C	not higher than		110		GB/T 6536
90% evaporati	on temperatu	ire/°C	not higher than		190		
Final boiling po	oint/°C		not higher than		205		
Residual amoun	nt (volume fra	action)/%	no greater than		2		
Vapor pressure 6 /	cPa						
May 1 to Octo	har 31				45~85		GB/T 8017
May 1 to Octo	00151	(100 T)			40~65.		CTD / T 0.01.0
Solvent washing g	um content/(mg/100mL)	no greater than		5		GB/T 8019
Induction period/r	nin (1)		not less than		480		GB/1 8018 CD/T 24100
Sulfur content a/(mg/kg)		no greater than		10		GB/1 34100
I niol (PhD test)		21.)/11			by		NB/SH/1 01/4
Copper sneet corr	osion (50°C,	3h)/level	no greater than		1		GB/1 5096
water-soluble acto	1 of alkali				по		OB/1 239
Mechanical impur	ities.		1		no		GB/T 511
Moisture (mass fr	action) /%	.) /0/	no greater than		0.20		SH/1 0246
Ethanol content (volume tract	10n) /%			10.0±2.0		NB/SH/1 0663
Other organic oxy	gen compou	nds content r (n	nass fraction) /% no greater than		0.5		NB/SH/T 0663
Benzene content	g (volume fra	ction)/%	no greater than		0.8		SH/T 0693
Aromatic hydroca	arbon content	h (volume frac	tionno)/gn/eater than		35		GB/T 30519
Olefin content h (volume fracti	on)/%	no greater than		18		GB/T 30519
Manganese conter	nt " /(g/L)		no greater than		0.002		SH/T 0711
Iron content . /(g/	(L)		no greater than		0.010		SH/T 0712
Density : (20°C)/(kg/m 3)				720 ~ 775		GB/T 1884, GB/T 1885
Silicon content j /	(mg/kg)		no greater than		5		GB/T 33647
Chlorine content	j /(mg/kg)		no greater than		10		SH/T 1757
Methylal content	(mass fractio	on) _{j, k} /(%)	no greater than		0.5		NB/SH/T 0994
Total content of a	aniline compo	ounds j, 1 /(mg/L)) no greater than		1500		Appendix B

a Do not artificially add additives containing lead, iron, or manganese.

SH/T 0794 can also be used for determination. In case of objection, the GB/T 8017 method shall prevail. During the change of seasons, gas stations are allowed 15 days

Swap. Heilongjiang, Jilin, Liaoning, Inner Mongolia, Gansu, Ningxia, Qinghai, Tibet, and Xinjiang using ethanol gasoline (E10) for vehicles From October 1st to April 30th, the winter vapor pressure will be implemented, and from May 1st to September 30th, the summer vapor pressure will be implemented.

From October 1st to April 50th, the winter vapor pressure will be implemented, and from May 1st to September 50th, the summer vapor pressure will be implemented.

Guangdong, Guangxi, Hainan, and Fujian regions that use ethanol gasoline (E10) for vehicles implement this requirement throughout the year. SH/T 0689, GB/T 11140, SH/T 0253, NB/SH/T 0842 can also be used for determination. In case of objection, GB/T 34100

The method shall prevail.

Visual inspection can also be used: the sample is injected into a 100mL glass measuring cylinder for observation. It should be transparent and free of suspended and sedimented mechanical impurities In case of objection, the GB/T 511 method shall prevail.

No artificial joining is allowed. SH/T 0720 can also be used for determination. In case of objection, the method of NB/SH/T 0663 shall prevail.

SH/T 0713, GB/T 28768, GB/T 30519 can also be used for determination. In case of objection, the SH/T 0693 method shall prevail.

^b GB/T 11132 and GB/T 28768 can also be used for determination. In case of objection, the GB/T 30519 method shall prevail.

SH/T 0604 can also be used for determination. In case of objection, the methods of GB/T 1884 and GB/T 1885 shall prevail.

No artificial joining is allowed. This item is not a required product inspection item, but when required by the quality inspection department, it shall be implemented in accordance with the provision

GB/T 33649 can also be used for determination. In case of objections, the NB/SH/T 0994 method (the latest version) shall prevail.

NB/SH/T 0991, GB/T 33649 can also be used for determination. In case of objection, appendix B shall prevail.

Page 10

GB 18351-20XX

5

Table 2 Technical requirements and test methods of ethanol gasoline (E10) (VIB) for vehicles

	· • • • • •	T4		Quality Index			
item	Item		89	92	95	experiment method	
Knock resistance:							
Research Octane !	Number (RO	N)	not less than	89	92	95	GB/T 5487
Anti-knock index	(RON+MO	N)/2	not less than	84	87	90	GB/T 503, GB/T 5487
Lead content a /(g	/L)		no greater than		0.005		GB/T 8020
Distillation range:							
10% evaporation	on temperat	ure/°C	not higher than		70		
50% evaporation	on temperat	ure/°C	not higher than		110		CD (7) (7) (
90% evaporation	on temperat	ure/°C	not higher than		190		GB/1 6536
Final boiling po	oint/°C		not higher than		205		
Residual amoun	it (volume fi	action)/%	no greater than		2		
Vapor pressure b /k	cPa						

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People's Republic of China National Standard Motor Ethanol Gasoline

November 1 to April 30		45~85	GB/T 8017
May 1 to October 31		40~65.	
Solvent washing gum content/(mg/100mL)	no greater than	5	GB/T 8019
Induction period/min	not less than	480	GB/T 8018
Sulfur content d /(mg/kg)	no greater than	10	SH/T 0689
Thiol (PhD test)		by	NB/SH/T 0174
Copper sheet corrosion (50°C, 3h)/level	no greater than	1	GB/T 5096
Water-soluble acid or alkali		no	GB/T 259
Mechanical impurities.		no	GB/T 511
Moisture (mass fraction) /%	no greater than	0.20	SH/T 0246
Ethanol content (volume fraction) /%		10.0±2.0	NB/SH/T 0663
Other organic oxygen-containing compound	content f (mass fraction)/% no greater than	0.5	NB/SH/T 0663
Benzene content g (volume fraction)/%	no greater than	0.8	SH/T 0693
Aromatic hydrocarbon content h (volume fra	ctionno)/gn/eater than	35	GB/T 30519
Olefin content h (volume fraction)/%	no greater than	15	GB/T 30519
Manganese content " /(g/L)	no greater than	0.002	SH/T 0711
Iron content a /(g/L)	no greater than	0.010	SH/T 0712
Density : (20°C)/(kg/m 3)		720 ~ 775	GB/T 1884, GB/T 1885
Silicon content j /(mg/kg)	no greater than	5	GB/T 33647
Chlorine content j /(mg/kg)	no greater than	10	SH/T 1757
Methylal content (mass fraction) j, k /(%)	no greater than	0.5	NB/SH/T 0994
Total content of aniline compounds j, 1 /(mg/I	 no greater than 	1500	Appendix B

a Do not artificially add additives containing lead, iron, or manganese.

.SH/T 0794 can also be used for determination. In case of objection, the GB/T 8017 method shall prevail. During the change of seasons, gas stations are allowed 15 days

Swap. Heilongjiang, Jilin, Liaoning, Inner Mongolia, Gansu, Ningxia, Qinghai, Tibet, and Xinjiang using ethanol gasoline (E10) for vehicles

From October 1st to April 30th, the winter vapor pressure will be implemented, and from May 1st to September 30th, the summer vapor pressure will be implemented.

Guangdong, Guangxi, Hainan, and Fujian regions that use ethanol gasoline (E10) for vehicles implement this requirement throughout the year.

⁴ SH/T 0689, GB/T 11140, SH/T 0253, NB/SH/T 0842 can also be used for determination. In case of objection, GB/T 34100

The method shall prevail.

Visual inspection can also be used: the sample is injected into a 100mL glass measuring cylinder for observation. It should be transparent and free of suspended and sedimented mechanical impurities In case of objection, the GB/T 511 method shall prevail.

⁶ No artificial joining is allowed. SH/T 0720 can also be used for determination. In case of objection, the method of NB/SH/T 0663 shall prevail.

⁶ SH/T 0713, GB/T 28768, GB/T 30519 can also be used for determination. In case of objection, the SH/T 0693 method shall prevail.

^b GB/T 11132 and GB/T 28768 can also be used for determination. In case of objection, the GB/T 30519 method shall prevail.

The SH/T 0604 method can also be used for determination. In case of objection, the GB/T 1884 and GB/T 1885 methods shall prevail.

No artificial joining is allowed. This item is not a required product inspection item, but when required by the quality inspection department, it shall be implemented in accordance with the provision

^b GB/T 33649 can also be used for determination. In case of objections, the NB/SH/T 0994 method (the latest version) shall prevail.

['] NB/SH/T 0991, GB/T 33649 can also be used for determination. In case of objection, appendix B shall prevail.

Page 11

6

GB 18351-20XX

table 3 Technical requirements and test methods for ethanol gasoline (E5) (VIA) for vehicles

					Quality Index		
	item	Item		89	92	95	experiment method
Knock resistance:							
Research Octane N	lumber (RON	J)	not less than	89	92	95	GB/T 5487
Anti-knock index	(RON+MON)/2	not less than	84	87	90	GB/T 503, GB/T 5487
Lead content a /(g/	L)		no greater than		0.005		GB/T 8020
Distillation range:							
10% evaporatio	n temperatu	re∕°C	not higher than		70		
50% evaporatio	n temperatu	re∕°C	not higher than		110		CP/T 6526
90% evaporatio	n temperatu	re∕°C	not higher than		190		GB/1 0550
Final boiling po	int/°C		not higher than		205		
Residual amount	t (volume fra	uction)/%	no greater than		2		
Vapor pressure b /k	Pa						
November 1 to	April 30				45~85		GB/T 8017
May 1 to Octob	ber 31				40~65.		
Solvent washing gu	im content/(mg/100mL)	no greater than		5		GB/T 8019
Induction period/m	nin		not less than		480		GB/T 8018
Sulfur content d /(n	ng/kg)		no greater than		10		SH/T 0689
Thiol (PhD test)					by		NB/SH/T 0174
Copper sheet corre	osion (50°C,	3h)/level	no greater than		1		GB/T 5096
Water-soluble acid	or alkali				no		GB/T 259
Mechanical impuri	ties.				no		GB/T 511
Moisture (mass fra	ction) /%		no greater than		0.20		SH/T 0246
Ethanol content (volume fract	ion) /%			5.0±1.5		NB/SH/T 0663
Oxygen content f	mass fractio	n) /% not grea	ater than		3.7		NB/SH/T 0663
Benzene content g	(volume frae	ction)/%	no greater than		0.8		SH/T 0693
Aromatic hydroca	rbon content	h (volume fra	ctionno)/@n/eater than		35		GB/T 30519
Olefin content h (v	olume fracti	on)/%	no greater than		18		GB/T 30519
Manganese conten	t "/(g/L)		no greater than		0.002		SH/T 0711

ron content a /(g/L)	no greater than	0.010	SH/T 0712
Density : (20°C)/(kg/m 3)		720 ~ 775	GB/T 1884, GB/T 1885
Silicon content ; /(mg/kg)	no greater than	5	GB/T 33647
Chlorine content j /(mg/kg)	no greater than	10	SH/T 1757
Methylal content (mass fraction) $_{j, k}$ /(%)	no greater than	0.5	NB/SH/T 0994
Fotal content of aniline compounds $_{j,1}$ /(mg/L)	no greater than	1500	Appendix B

a Do not artificially add additives containing lead, iron, or manganese.

sH/T 0794 can also be used for determination. In case of objection, the GB/T 8017 method shall prevail. During the change of seasons, gas stations are allowed 15 days

Swap. Heilongjiang, Jilin, Liaoning, Inner Mongolia, Gansu, Ningxia, Qinghai, Tibet, and Xinjiang using ethanol gasoline (E5) for vehicles

From October 1st to April 30th, the winter vapor pressure will be implemented, and from May 1st to September 30th, the summer vapor pressure will be implemented.

Guangdong, Guangxi, Hainan, and Fujian regions that use ethanol gasoline (E5) for vehicles implement this requirement throughout the year.

SH/T 0689, GB/T 11140, SH/T 0253, NB/SH/T 0842 can also be used for determination. In case of objection, GB/T 34100

The method shall prevail.

' Visual inspection can also be used: the sample is injected into a 100mL glass measuring cylinder for observation. It should be transparent and free of suspended and sedimented mechanical impurities In case of objection, the GB/T 511 method shall prevail.

SH/T 0720 can also be used for determination. In case of objection, the method of NB/SH/T 0663 shall prevail. Other oxygen-containing compounds allowed to be added are

Methyl tert-butyl ether (MTBE), the content of other organic oxygen-containing compounds except MTBE is not more than 0.5% (mass fraction).

⁶ SH/T 0713, GB/T 28768, GB/T 30519 can also be used for determination. In case of objection, the SH/T 0693 method shall prevail.

^b GB/T 11132 and GB/T 28768 can also be used for determination. In case of objection, the GB/T 30519 method shall prevail.

- SH/T 0604 can also be used for determination. In case of objection, the methods of GB/T 1884 and GB/T 1885 shall prevail.
- No artificial joining is allowed. This item is not a required product inspection item, but when required by the quality inspection department, it shall be implemented in accordance with the provision

⁶ GB/T 33649 can also be used for determination. In case of objections, the NB/SH/T 0994 method (the latest version) shall prevail.

NB/SH/T 0991, GB/T 33649 can also be used for determination. In case of objection, appendix B shall prevail.

Page 12

GB 18351-20XX

7

Table 4 Technical requirements and test methods of ethanol gasoline (E5) (VIB) for vehicles

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:			Quality Index		
item Item		89	92	95	experiment method
Knock resistance:					
Research Octane Number (RON)	not less than	89	92	95	GB/T 5487
Anti-knock index (RON+MON)/2	not less than	84	87	90	GB/T 503, GB/T 5487
Lead content a /(g/L)	no greater than		0.005		GB/T 8020
Distillation range:					
10% evaporation temperature/°C	not higher than		70		
50% evaporation temperature/°C	not higher than		110		GB/T 6536
90% evaporation temperature/°C	not higher than		190		
Final boiling point/°C	not higher than		205		
Residual amount (volume fraction)/%	% no greater than		2		
Vapor pressure b /kPa					
November 1 to April 30			45~85		GB/T 8017
May 1 to October 31			40~65.		
Solvent washing gum content/(mg/100r	nL) no greater than		5		GB/T 8019
Induction period/min	not less than		480		GB/T 8018
Sulfur content d /(mg/kg)	no greater than		10		SH/T 0689
Thiol (PhD test)			by		NB/SH/T 0174
Copper sheet corrosion (50°C, 3h)/leve	el no greater than		1		GB/T 5096
Water-soluble acid or alkali			no		GB/T 259
Mechanical impurities.			no		GB/T 511
Moisture (mass fraction) /%	no greater than		0.20		SH/T 0246
Ethanol content (volume fraction) /%			5.0±1.5		NB/SH/T 0663
Oxygen content f (mass fraction)/% no	t greater than		3.7		NB/SH/T 0663
Benzene content g (volume fraction)/%	no greater than		0.8		SH/T 0693
Aromatic hydrocarbon content h (volur	ne fractionno)/gn/eater than		35		GB/T 30519
Olefin content h (volume fraction)/%	no greater than		15		GB/T 30519
Manganese content a /(g/L)	no greater than		0.002		SH/T 0711
Iron content " /(g/L)	no greater than		0.010		SH/T 0712
Density : (20°C)/(kg/m 3)			720~775		GB/T 1884, GB/T 1885
Silicon content j /(mg/kg)	no greater than		5		GB/T 33647
Chlorine content j /(mg/kg)	no greater than		10		SH/T 1757
Methylal content (mass fraction) j, k /(%	6) no greater than		0.5		NB/SH/T 0994
Total content of aniline compounds j , 1	/(mg/L) no greater than		1500		Appendix B

a Do not artificially add additives containing lead, iron, or manganese.

.SH/T 0794 can also be used for determination. In case of objection, the GB/T 8017 method shall prevail. During the change of seasons, gas stations are allowed 15 days

Swap. Heilongjiang, Jilin, Liaoning, Inner Mongolia, Gansu, Ningxia, Qinghai, Tibet, and Xinjiang using ethanol gasoline (E5) for vehicles in areas 10

The winter vapor pressure will be implemented from 1st to April 30th, and the summer vapor pressure will be implemented from May 1st to September 30th.

Guangdong, Guangxi, Hainan, and Fujian regions that use ethanol gasoline (E5) for vehicles implement this requirement throughout the year.

⁴ SH/T 0689, GB/T 11140, SH/T 0253, NB/SH/T 0842 can also be used for determination. In case of objection, GB/T 34100

The method shall prevail.

Visual inspection can also be used: the sample is injected into a 100mL glass measuring cylinder for observation. It should be transparent and free of suspended and sedimented mechanical impurities In case of objection, the GB/T 511 method shall prevail.

SH/T 0720 can also be used for determination. In case of objection, the method of NB/SH/T 0663 shall prevail. Other oxygen-containing compounds allowed to be added are

Methyl tert-butyl ether (MTBE), the content of other organic oxygen-containing compounds except MTBE is not more than 0.5% (mass fraction).

- ⁴ SH/T 0713, GB/T 28768, GB/T 30519 can also be used for determination. In case of objection, the SH/T 0693 method shall prevail.
 - ^b GB/T 11132 and GB/T 28768 can also be used for determination. In case of objection, the GB/T 30519 method shall prevail
 - The SH/T 0604 method can also be used for determination. In case of objection, the GB/T 1884 and GB/T 1885 methods shall prevail.
- No artificial joining is allowed. This item is not a required product inspection item, but when required by the quality inspection department, it shall be implemented in accordance with the provision
 - GB/T 33649 can also be used for determination. In case of objections, the NB/SH/T 0994 method (the latest version) shall prevail.

NB/SH/T 0991, GB/T 33649 can also be used for determination. In case of objection, appendix B shall prevail.

Page 13

8

GB 18351-20XX

9

Appendix A

(Normative appendix)

Technical requirements and test methods of ethanol gasoline (E10) for car 98 and ethanol gasoline (E5) for car 98

The technical requirements and test methods of ethanol gasoline (E10) (VIA)/(VIB) for No. 98 cars are shown in Table A.1, No. 98 ethanol gasoline (E5) for cars

The technical requirements and test methods of (VIA)/(VIB) are shown in Table A.2.

Table A.1 Technical requirements and test methods of ethanol gasoline (E10) (VIA)/(VIB) for No. 98 car

item Item		Quality Index	experiment method
Knock resistance:			
Research Octane Number (RON)	not less than	98	GB/T 5487
Anti-knock index (RON+MON)/2	not less than	93	GB/T 503, GB/T 5487
Lead content a /(g/L)	no greater than	0.005	GB/T 8020
Distillation range:			
10% evaporation temperature/°C	not higher than	70	
50% evaporation temperature/°C	not higher than	110	GB/T 6536
90% evaporation temperature/°C	not higher than	190	
Final boiling point/°C	not higher than	205	
Residual amount (volume fraction)/%	no greater than	2	
Vapor pressure 6 /kPa			
November 1 to April 30		45~85	GB/T 8017
May 1 to October 31		40~65.	CTD IT 0010
Solvent washing gum content/(mg/100mL)	no greater than	5	GB/T 8019
Induction period/min	not less than	480	GB/1 8018
Sulfur content a /(mg/kg)	no greater than	10	SH/1 0689
Thiol (PhD test)		by .	NB/SH/T 0174
Copper sheet corrosion (50°C, 3h)/level	no greater than	1	GB/T 5096
water-soluble acid or alkali		no	GB/1 239
Mechanical impurities.	1	no	GB/T 511
Moisture (mass fraction) /%	no greater than	0.20	SH/1 0246
Ethanol content (Volume fraction) /%	1	10.0±2.0	NB/SH/1 0663
Other organic oxygen-containing compoun	no greater than	0.5	NB/SH/T 0663
Benzene content g (volume fraction)/%	no greater than	0.8	SH/T 0693
Aromatic hydrocarbon content h (volume fi	ractionno)/gn/eater than	35	GB/T 30519
Olefin content h (volume fraction)/%	no greater than	15	GB/T 30519
Manganese content a /(g/L)	no greater than	0.002	SH/T 0711
Iron content a /(g/L)	no greater than	0.010	SH/T 0712
Density : (20°C)/(kg/m 3)		720 ~ 775	GB/T 1884, GB/T 1885
Silicon content j /(mg/kg)	no greater than	5	GB/T 33647
Chlorine content j /(mg/kg)	no greater than	10	SH/T 1757
Methylal content (mass fraction) $_{j,k}/\!(\%)$	no greater than	0.5	NB/SH/T 0994
Total content of aniline compounds $_{j,1}/(mg$	/L) no greater than	1500	Appendix B

GB 18351-20XX

item Item	Quality Index	experiment method
a Do not artificially add additives containing lead, iron, or manganese.		

sH/T 0794 can also be used for determination. In case of objection, the GB/T 8017 method shall prevail. During the change of seasons, gas stations are allowed 15 days

Swap. Heilongjiang, Jilin, Liaoning, Inner Mongolia, Gansu, Ningxia, Qinghai, Tibet, and Xinjiang using ethanol gasoline (E10) for vehicles

From October 1st to April 30th, the winter vapor pressure will be implemented, and from May 1st to September 30th, the summer vapor pressure will be implemented.

Guangdong, Guangxi, Hainan, and Fujian regions that use ethanol gasoline (E10) for vehicles implement this requirement throughout the year.

⁴ SH/T 0689, GB/T 11140, SH/T 0253, NB/SH/T 0842 can also be used for determination. In case of objection, GB/T 34100

The method shall prevail.

Visual inspection can also be used: the sample is injected into a 100mL glass measuring cylinder for observation. It should be transparent and free of suspended and sedimented mechanical impurities In case of objection, the GB/T 511 method shall prevail.

- ⁶ No artificial joining is allowed. SH/T 0720 can also be used for determination. In case of objection, the method of NB/SH/T 0663 shall prevail.
- ⁶ SH/T 0713, GB/T 28768, GB/T 30519 can also be used for determination. In case of objection, the SH/T 0693 method shall prevail.
- ^b GB/T 11132 and GB/T 28768 can also be used for determination. In case of objection, the method of GB/T 30519 shall prevail.

SH/T 0604 can also be used for determination. In case of objection, the methods of GB/T 1884 and GB/T 1885 shall prevail.

- ¹ No artificial joining is allowed. This item is not a required product inspection item, but when required by the quality inspection department, it shall be implemented in accordance with the provision
- ^b GB/T 33649 can also be used for determination. In case of objections, the NB/SH/T 0994 method (the latest version) shall prevail.

NB/SH/T 0991, GB/T 33649 can also be used for determination. In case of objection, appendix B shall prevail.

10

Page 15

GB 18351-20XX

Table A.2 Technical requirements and test methods of ethanol gasoline (E5) (VIA)/(VIB) for No. 98 vehicle

item I	tem	Quality Index	experiment method
Knock resistance:			
Research Octane Number (RON)	not less than	98	GB/T 5487
Anti-knock index (RON+MON)/2	not less than	93	GB/T 503, GB/T 5487
Lead content a /(g/L)	no greater than	0.005	GB/T 8020
Distillation range:			
10% evaporation temperature/c	C not higher than	70	
50% evaporation temperature/	C not higher than	110	
90% evaporation temperature/	C not higher than	190	GB/1 6536
Final boiling point/°C	not higher than	205	
Residual amount (volume fraction	on)/% no greater than	2	

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Vapor pressure b /kPa			
November 1 to April 30		45~85	GB/T 8017
May 1 to October 31		40~65.	
Solvent washing gum content/(mg/100mL)	no greater than	5	GB/T 8019
Induction period/min	not less than	480	GB/T 8018
Sulfur content d /(mg/kg)	no greater than	10	SH/T 0689
Thiol (PhD test)		by	NB/SH/T 0174
Copper sheet corrosion (50°C, 3h)/level	no greater than	1	GB/T 5096
Water-soluble acid or alkali		no	GB/T 259
Mechanical impurities.		no	GB/T 511
Moisture (mass fraction) /%	no greater than	0.20	SH/T 0246
Ethanol content (volume fraction) /%		5.0±1.5	NB/SH/T 0663
Oxygen content r (mass fraction) no greater t	han	3.7	NB/SH/T 0663
Benzene content g (volume fraction)/%	no greater than	0.8	SH/T 0693
Aromatic hydrocarbon content h (volume fra	actionno)/gn/eater than	35	GB/T 30519
Olefin content h (volume fraction)/%	no greater than	15	GB/T 30519
Manganese content a /(g/L)	no greater than	0.002	SH/T 0711
Iron content " /(g/L)	no greater than	0.010	SH/T 0712
Density : (20°C)/(kg/m 3)		720~775	GB/T 1884, GB/T 1885
Silicon content j /(mg/kg)	no greater than	5	GB/T 33647
Chlorine content j /(mg/kg)	no greater than	10	SH/T 1757
Methylal content (mass fraction) $_{j,k}/(\%)$	no greater than	0.5	NB/SH/T 0994
Total content of aniline compounds j, 1 /(mg/	L) no greater than	1500	Appendix B

a Do not artificially add additives containing lead, iron, or manganese.

sH/T 0794 can also be used for determination. In case of objection, the GB/T 8017 method shall prevail. During the change of seasons, gas stations are allowed 15 days

Swap. Heilongjiang, Jilin, Liaoning, Inner Mongolia, Gansu, Ningxia, Qinghai, Tibet, and Xinjiang using ethanol gasoline (E5) for vehicles in areas 10

The winter vapor pressure will be implemented from 1st to April 30th, and the summer vapor pressure will be implemented from May 1st to September 30th.

Guangdong, Guangxi, Hainan, and Fujian regions that use ethanol gasoline (E5) for vehicles implement this requirement throughout the year.

⁴ SH/T 0689, GB/T 11140, SH/T 0253, NB/SH/T 0842 can also be used for determination. In case of objection, GB/T 34100

The method shall prevail.

Visual inspection can also be used: the sample is injected into a 100mL glass measuring cylinder for observation. It should be transparent and free of suspended and sedimented mechanical impurities In case of objection, the GB/T 511 method shall prevail.

SH/T 0720 can also be used for determination. In case of objection, the method of NB/SH/T 0663 shall prevail. Other oxygen-containing compounds allowed to be added are

Methyl tert-butyl ether (MTBE), the content of other organic oxygen-containing compounds except MTBE is not more than 0.5% (mass fraction).

* SH/T 0713, GB/T 28768, GB/T 30519 can also be used for determination. In case of objection, the SH/T 0693 method shall prevail.

^a GB/T 11132 and GB/T 28768 can also be used for determination. In case of objection, the method of GB/T 30519 shall prevail.

SH/T 0604 can also be used for determination. In case of objection, the methods of GB/T 1884 and GB/T 1885 shall prevail.

No artificial joining is allowed. This item is not a required product inspection item, but when required by the quality inspection department, it shall be implemented in accordance with the provision

GB/T 33649 can also be used for determination. In case of objections, the NB/SH/T 0994 method (the latest version) shall prevail.

NB/SH/T 0991, GB/T 33649 can also be used for determination. In case of objection, appendix B shall prevail.

Page 16

GB 18351-20XX

11

Appendix B

(Normative appendix)

Separation and Determination of Aniline Compounds in Gasoline Solid Phase Extraction/Gas Chromatography-Mass Spectrometry

B.1 Method summary

Add an appropriate amount of sample dropwise to the solid phase extraction column, and use different polar solvents to elute to separate the hydrocarbon components from the Into the aniline compound components separated by extraction, add a certain volume of internal standard solution, and then introduce the gas chromatography-mass spectrometer to c Use full scan and selected ion scan methods for qualitative analysis.

B.2 Method application

This method can be used to determine aniline compounds in gasoline, and can also be used to identify artificially added aniline compounds in gasoline and determine their content. It is of great significance to effectively control and supervise the quality of gasoline and to further improve the quality of gasoline products.

B.3 Apparatus

B.3.1 Solid phase extraction separation system

B.3.1.1 Solid phase extraction column: As shown in Figure B.1, the solid phase extraction column is a 3 mL solid phase extraction column with about 1.5 g of stationary phase.

It is modified silica gel. The role of solid phase extraction is to effectively separate hydrocarbon compounds and aniline compounds in gasoline. Solid phase extraction column See Appendix A in NB/SH/T 0994-2019 for detailed verification process and standards of separation efficiency.

Note 1: The solid-phase extraction column that meets the requirements of this method can be provided by the Research Institute of Petroleum and Chemical Industry of China Petroleum and Chemical Cc The required solid phase extraction column can also be used.

Note 2: The solid phase extraction column should be sealed and stored.

Note 3: The solid phase extraction column cannot be reused

- 1-Sample entrance;
- 2-Gland;
- 3-Extraction column;
- 4-Sieve plate;
- 5-stationary phase;
- 6—Sample export.

Figure B.1 Schematic diagram of solid phase extraction column

B.3.1.2 Conical flask: 25mL.

B.3.1.3 Syringe: 5mL, 1mL.

B.3.1.4 Pipette gun or pipette: 1000µL.

B.3.1.5 Pipette gun: 100µL.

B.3.1.6 Volumetric flask: 25mL or 50mL.

B.3.2 Gas Chromatography-Mass Spectrometry Analysis System

B.3.2.1 Any gas chromatography-mass spectrometer that meets the performance and parameter requirements listed in Table B.1 can be used.

B.3.2.2 Chromatographic column: a non-polar quartz capillary column with a stationary phase of 100% dimethyl polysiloxane, so that the sample is divided by boiling point from

B.3.2.3 Vaporization system: split sampling can be used, but it must be ensured that the actual sample volume entering the gas chromatography-mass spectrometer system satisfies the

12

Page 17

GB 18351-20XX

The linear range of the detector is required.

B.3.2.4 Mass spectrometry ion source: electron impact ionization source.

B.3.2.5 Scan mode: It has the functions of full scan and selective ion scan.

B.3.2.6 Chromatography-mass spectrometry workstation: obtain collected total ion current and selected ion chromatograms, display and measure the mass spectra of chromatographic The peak area of the chromatographic peak.

Table B.1 Typical Chromatography-Mass Spectrometer Operating Parameters

Chromatography	
Column	Quartz capillary column
size	Column length 30m, inner diameter 0.25mm, film thickness 0.25µm
Stationary Phase	Non-polar, 100% dimethyl polysiloxane
temperature	
Vaporization chamber/°C	250
Oven	Keep at 40°C for 2min, then increase to 250°C at 40°C/min, keep for 2min
Carrier gas	Helium
Column flow rate/(mL/min)	1.0
Split ratio	Condition 1: 20:1, Condition 2: 100:1
Injection volume/µL	Condition 1: 1.0, Condition 2: 0.2
Mass spectrometry	
source of ion	Electron bombardment ionization source
Ionization energy	70eV
scanning method	Full scan/selected ion scan. Mass range of full scan: 20 amu \sim 200 amu; the detection ion of selective ion scan is shown in the quantitative ion in Table B.4

child 4.5

Solvent delay/min

Note: The instrument parameters given in the table are optional parameter conditions, and the appropriate instrument conditions are in accordance with the requirements determine.

B.4 Reagents and materials

- B.4.1 Reagents
- B.4.1.1 n-heptane: chromatographically pure.

B.4.1.2 Dichloromethane: analytically pure.

Warning-Toxic, if ingested or absorbed through the skin will cause harm to the human body.

B.4.1.3 Acetone: chromatographically pure.

Warning-Toxic, if ingested or absorbed through the skin will cause harm to the human body.

B.4.1.4 Pentadecane: the purity should not be less than 99.0%

B.4.1.5 Internal standard solution: Dissolve n-pentadecane in n-heptane with a mass concentration of 10.00g/L.

B.4.1.6 Reagents for qualitative and quantitative aniline compounds: aniline, N-methylaniline, o-methylaniline, p-methylaniline, m-methylaniline

Methylaniline, o-ethylaniline, m-ethylaniline, p-ethylaniline, 2,6-dimethylaniline, 2,5-dimethylaniline, 2,4-dimethylbenzene

Amine, 2,3-dimethylaniline, 3,5-dimethylaniline, 3,4-dimethylaniline, 2.4.6-trimethylaniline. The purity of the reagent should not be less than 98.0%.

B.4.1.7 Quality control inspection samples: samples used for the reliability of routine testing methods, containing aniline, N-methylaniline, and o-methylbenzene

Amine, m-methylaniline, o-ethylaniline, 2,5-dimethylaniline, 2,3-dimethylaniline, 2.4.6-trimethylaniline gasoline samples, each

The mass concentration of the compound is 2g/L, and the compound is prepared by quantitatively adding the above compound to the gasoline sample with the content of these comp

Made or purchased. Quality control inspection samples should be sealed in packaging and stored at 0°C ~ 5°C. The compound composition during storage

Should remain unchanged.

13

Page 18

GB 18351-20XX

B.4.1.8 Calibration sample (1): accurately weigh and mix each aniline compound in a 25mL or 50mL volumetric flask, and prepare Table B.2

Calibration samples with serial numbers 1 to 5 (1). The compounds included in the calibration sample (1) are pentadecane, aniline, N-methylaniline, o-

Methylaniline, m-methylaniline, o-ethylaniline, 2,5-dimethylaniline, 2,3-dimethylaniline, 2.4.6-trimethylaniline, use n-heptane

Constant volume, the recommended concentration of each component is shown in Table B.2. The calibration sample should be sealed in packaging and stored at 0°C ~ 5°C. The compo The composition should remain unchanged.

Serial numMenomer compound concentration/(g/L)	Mass of monomer compound/mass of n-pentadecane

1	0.0500	0.100
2	0.0250	0.050
3	0.0125	0.025
4	0.0050	0.010
5	0.0025	0.005

Note: The concentration of n-pentadecane is 0.50g/L.

B.4.1.9 Calibration sample (2): accurately weigh and mix each aniline compound in a 25mL or 50mL volumetric flask, and prepare Table B.3

Calibration samples with serial numbers 1~5 (2). The compounds included in the calibration sample (2) are pentadecane, aniline, N-methylaniline, o-

Methylaniline, m-methylaniline, o-ethylaniline, 2,5-dimethylaniline, 2,3-dimethylaniline, 2.4.6-trimethylaniline, use n-heptane

Constant volume, the recommended concentration of each component is shown in Table B.2. The calibration sample should be sealed in packaging and stored at $0^{\circ}C \sim 5^{\circ}C$. The composition should remain unchanged.

Table B.3 Calibration sample (two) preparation table

Serial num Renomer compound concentration/(g/L)		Mass of monomer compound/mass of n-pentadecane	
1	1.5	3.0	

2	1.0	2.0
3	0.5	1.0
4	0.2	0.4
5	0.1	0.2

Note: The concentration of n-pentadecane is 0.50g/L.

B.4.2 Materials

Carrier gas: helium, with a purity of not less than 99.99%.

Warning-high pressure gas, pay attention to safety.

B.5 Sampling

Unless otherwise specified, sampling should be carried out in accordance with GB/T 4756. The samples should be stored in airtight containers. The storage temperature is require

B.6 Preparation of gas chromatography-mass spectrometer and establishment of conditions

B.6.1 In general, when the gas chromatograph-mass spectrometer is running continuously, no other preparations are required before analyzing the sample. If the instrument has just stall is necessary to check the state of the instrument according to this method and the instrument manual to ensure that the instrument is stable.

B.6.2 Analyze the calibration sample (1) with serial number 1 in B.4.1.8 according to condition 1 in Table B.1, and use the full scan method to obtain

To the total ion current chromatogram shown in Figure B.2. Test the separation effect of each aniline compound. If necessary, adjust the column temperature program or

Replace the chromatographic column to achieve complete separation of the compounds. To determine the retention time of each compound peak, see Table B.4.

GB 18351-20XX

Note: See Table B.4 for the peak number.

The total ion current chromatogram of the calibration sample (1) in Figure B.2 and B.4.1.8

B.6.3 According to the retention time and quantitative ion of each compound in Table B.4, determine the start and end time of the selective ion scan of each compound. Set the selective ion scan conditions. Perform gas chromatography on the calibration sample with serial number 1 in B.4.1.8 (1) using selective ion scanning conditions -Mass spectrometry analysis, the selected ion chromatogram shown in Figure B.3 is obtained. The number of anilines detected in the selected ion chromatogram should be 9 If there is a missing compound, adjust the start and end time of the selected ion scan for the missing compound.

Table B.4 Select ion scanning conditions to determine compound names and quantitative ions

D1h	Compound Qu	·····	Detention time/min	Scanning quantitative ion start-
Peak number		lantitative ion	Retention time/min	End time/min
1	aniline	93	4.74	4.50~5.00
2	N-methylaniline	106	5.21	5.00~5.50
3	O-methylaniline	106	5.24	5.00~5.50
4	M-methylaniline	106	5.27	5.00~5.50
5	O-ethylaniline	106	5.61	5.50~5.90
6	2,5-Dimethylaniline	106	5.69	5.50~5.90
7	2,3-Dimethylaniline	106	5.81	5.50~5.90
8	2.4.6-Trimethylaniline	120	6.05	5.59~6.50
9	Pentadecane (internal standard) 57	6.90	6.50~7.50

Note: The start and end time of the selected ion scan can be changed according to the actual peak retention time of each compound.

B.7 Calibration

B.7.1 According to the selected ion scanning conditions determined in B.6.3, analyze each calibration sample in B.4.1.8 according to Condition 1 in Table B.1

Product (1), aniline, N-methylaniline, o-methylaniline, m-methylaniline, o-ethylaniline, 2,5-dimethylaniline, 2,3-

The peak areas of dimethylaniline, 2.4.6-trimethylaniline and internal standard peaks are calculated according to formula (B.1) and formula (B.2) for each calibration sample. The response ratio (X_i) and mass ratio (Y_i) of each component in product (1).

B.7.2 According to the selected ion scanning conditions determined in B.6.3, analyze each calibration sample in B.4.1.9 according to condition 2 in Table B.1

Product (two), measured aniline, N-methylaniline, o-methylaniline, m-methylaniline, o-ethylaniline, 2,5-dimethylaniline, 2,3-

The peak areas of dimethylaniline, 2.4.6-trimethylaniline and internal standard peaks are calculated according to formula (B.1) and formula (B.2) for each calibration sample. The response ratio (X_i) and mass ratio (Y_i) of each component in the product (two).

15

Page 20

GB 18351-20XX

Note: See Table B.4 for the peak number.

Figure B.3 B.4.1.8 Calibration sample (1) Selected ion scan chromatogram

B.7.3 to X-1 as the abscissa, the Y1 as the ordinate, the correction samples were made in accordance with the least squares method (a) and a calibration sample (ii)

For the quantitative calibration curve of each component to be tested in, draw a working curve through the origin, and the calibration curve of the component can be expressed accord. To ensure the accuracy of quantification, the square of the correlation coefficient (R_2) of the quantitative calibration curve should not be less than 0.995.



Where:

 $\mathit{A}\,\mathtt{d}\,{-\!\!\!-\!\!}$ the peak area of the component to be tested;

A n—The peak area of the internal standard.

 $Y_i = \begin{array}{c} M_i \\ M_s \end{array}$ (B.2)

Where:

 M_{i} —the mass of the component to be tested, in grams (g);

 $M_{\rm s}$ —The mass of the internal standard, in grams (g).

 $Y_i = a_i \times X_i$ (B.3)

Where:

a i—The slope of the linear equation of the compound *i to* be tested .

B.8 Test procedure

B.8.1 Solid phase extraction separation steps

B.8.1.1 Take a solid phase extraction column, use a pipette or pipette to accurately suck 500 µL of sample into the upper sieve plate of the solid phase extraction column On and is completely adsorbed.

B.8.1.2 Wash the stationary phase with 5 mL of a mixed solution of n-heptane and dichloromethane in a volume ratio of 8:2 and 1 mL of acetone in sequence, and wait until the acetone Just after the liquid completely enters the upper sieve plate in the solid phase extraction column, the hydrocarbon eluent is discarded. The elution rate is about 5mL/min. B.8.1.3 Place a 25mL conical flask at the lower end of the sample outlet of the solid phase extraction column, wash the stationary phase with 5mL acetone, and elute all The adsorbed aniline components and the eluent of the aniline components are collected in this 25 mL conical flask. The elution rate is about 5mL/min.

Note: A syringe can be connected to the upper mounting adapter of the solid phase extraction column for pressure to control the solvent flow rate.

B.8.1.4 Use a pipette to accurately draw 100 μ L of the internal standard solution and add it to the 25 mL cone that receives the eluate of the aniline compound component. In the bottle, shake well.

16

Page 21

GB 18351-20XX

Note: If the eluent of this aniline compound component is not analyzed in time by gas chromatography-mass spectrometry, it should be sealed and stored at 0°C~5°C.

B.8.2 Gas chromatography-mass spectrometry analysis

Compo anilir N-methyl

B.8.2.1 Preparation of gas chromatograph-mass spectrometer: Before analyzing samples, run the instrument dry once according to the analysis steps to remove the gas chromatograph Residual substances inside.

B.8.2.2 Perform gas chromatography-mass spectrometry analysis with the eluent of the aniline compound component that has been added to the internal standard in B.8.1.4, using full: Qualitative analysis is performed by scanning mode, and quantitative analysis is performed using selective ion scanning conditions. If the instrument function permits, it is recommend And selective ion detection method for gas chromatography-mass spectrometry analysis.

B.8.2.2.1 Qualitative analysis: According to the condition 1 in Table B.1, enter the eluate of the aniline compounds that have been added to the internal standard in B.8.1.4

Perform gas chromatography-mass spectrometry analysis, and use full scan mode for qualitative analysis. Total ionic current color of the eluent of aniline compounds

The retention time of the chromatographic peak in the spectrum and the chromatographic peak in the calibration sample No. 1 in B.4.1.8 (1) The total ion current chromatogram (see Figure 1) for the retention time overlaps and is consistent with the corresponding qualifier ion in Table B.5, it can be determined that the corresponding test compound exists in the sample. C2 tak The substituted aniline compounds have 9 isomers. Under this analysis condition, some compounds will have overlapping peaks (see Figure B.4).

For example, the peaks of p-ethylaniline and 2,4/2,6-dimethylaniline overlap, and the peaks of m-ethylaniline and 2,5/3,5-dimethylaniline overlap. methyl

The peaks of aniline overlap. In this case, refer to the mass spectra of typical ethylaniline and dimethylaniline in Figure B.5. The difference between ethylaniline and dimethylaniline

Dimethylaniline is used to distinguish types. If there is a strong m/z=120 peak in the mass spectrum, it means it is dimethylaniline. If m/z=120 peaks means it is dimethylaniline in the mass spectrum in the mass spectrum is the mass spectrum in the mass spectrum in the mass spectrum is the mass spectrum in the mass spectrum in the mass spectrum is the mass spectrum in the mass spectrum in the mass spectrum is the mass spectrum in the mass spectrum in the mass spectrum is the mass spectrum in the mass spect

The weaker is ethylaniline. Figure B.6 shows the selective ion chromatogram of aniline compounds in a typical gasoline sample and the assignment of each peak.

Table B.5 Qualitative ions of aniline compounds

ound	Qualifier i
ie	66, 93
aniline	77, 106, 107
	77, 106, 107

Ortho/meta/p-methylaniline Ethylaniline	77, 106, 121
Dimethylaniline	77, 106, 120, 121
Trimethylaniline	91, 120, 134, 135

Description:

1-O-ethylaniline; 4-2,6-Dimethylaniline;

2—2,4-Dimethylaniline; 3—P-ethylaniline; 8-3,4-Dimethylaniline;

6-2,5-Dimethylaniline;

5-M-ethylaniline;

9-2,3-dimethylaniline

7—3,5-Dimethylaniline;

Figure B.4 Total ion current chromatogram of C2 substituted anilines

17

Page 22

GB 18351-20XX

Figure B.5 Typical mass spectra of ethyl aniline and dimethyl aniline

Description:	
1—Aniline;	5-2,4/2,6-dimethylaniline and p-ethylaniline;
2-Ortho/p-methylaniline;	6-2,5/3,5-dimethylaniline and m-ethylaniline;
3-m-methylaniline;	7-3,4/2,3-dimethylaniline;
4-O-ethylaniline;	8-Trimethylaniline
	Figure B.6 Selected ion chromatogram of aniline compounds in typical gasoline

B.8.2.2.2 Quantitative analysis: According to the selected ion scanning conditions determined in Article B.6.3, the internal standard has been added to B.8.1.4 according to the conditio The cluent of the aniline components of the substance was analyzed by gas chromatography-mass spectrometry. Obtain the peak area and internal standard peak surface of each comp product. If the content of monomer aniline compounds is greater than 0.2g/L, the selective ion scanning conditions determined in Article B.6.3 shall be followed and the conditions in 7 Part 2 is to perform gas chromatography-mass spectrometry analysis on the eluent of the aniline compound component that has been added to the internal standard in B.8.1.4. Get each The peak area of the substance and the peak area of the internal standard.

B.9 Quality control inspection

In order to confirm the reliability of the analysis system, after the instrument has been in operation for three months or the instrument has been maintained and repaired, the quality Check the sample (B.4.1.7) for analysis. The analysis procedure of the quality control check sample is the same as that of the gasoline sample. Determine each component The content should be consistent with the reference value. If the measurement result exceeds the reference value \pm (R/ 2) range (R is the reproducibility requirement in B.11.1.3), then Check the separation efficiency of the solid phase extraction column and the operating conditions of the instrument.

B.10 Calculations and reports

18

Page 23

GB 18351-20XX

B.10.1 Calculation of the mass concentration of aniline compounds: after qualitative analysis of the peak, the selected ion color obtained by the analysis of the selected ion scanning c_i . The spectrum determines the peak area of the aniline compound to be tested and the peak area of the internal standard, according to the equation slope of the test compound obtained Calculate the mass concentration (C_i) of each monomer aniline compound in the sample according to formula (B.4), the unit is g/L.

.....(B.4)

Where:

a i—The slope of the linear equation of the aniline compound i to be tested;

A i —the peak area of the aniline compound i to be tested;

A s—The peak area of the internal standard.

N—the mass concentration of the internal standard substance, in grams per liter (g/L);

 V_1 —The volume of the internal standard solution added; the unit is microliter (µL);

V2-sample volume, in microliters (µL).

Note: The ortho/meta/p-ethylaniline are calculated according to the slope of the o-ethylaniline equation to calculate the mass concentration of ortho/meta/p-ethylaniline in the sample; 2,4/2,5/2,6/3 5 Tu The mass concentration of 2,4/2,5/2,6/3,5-dimethylaniline in the sample is calculated according to the slope of the 2,5-dimethylaniline equation for methylaniline; 3,4/2,3 -Dimethyl

The mass concentration of 3,4/2,3-dimethylaniline in the sample is calculated according to the slope of the 2,3-dimethylaniline equation for aniline.

B.10.2 Calculation of the mass fraction of aniline compounds in the sample: If required, calculate each monomer aniline in the sample according to formula (B.5) The mass fraction of the compound W_1 (%).

Where:

Ci — The mass concentration of monomer aniline compounds calculated by formula (B.4), in grams per liter (g/L);

d-The density of the tested gasoline sample (determined in accordance with SH/T 0604), in grams per milliliter (g/mL).

B.10.3 Calculation of the mass concentration of total aniline compounds in the sample: the mass concentration of total aniline compounds in the sample can be calculated according to Degree (C w/), the unit is g/L.

.....(B.6)

Where:

C i — The mass concentration of monomer aniline compounds calculated by formula (B.4), in grams per liter (g/L).

B.10.4 Calculation of the mass fraction of total aniline compounds in the sample: the mass fraction of total aniline compounds in the sample can be calculated according to formula (B.7). Number (*W_{sot}*), the unit is %.

.....(B.7)

Where:

Wi - The mass fraction of monomer aniline compounds calculated by formula (B.5), in %.

GB 18351-20XX

B.10.5 Report the mass concentration of monomer aniline compounds and total aniline compounds in the sample, if the monomer aniline compounds and total aniline compounds If the mass concentration of the compound is less than 0.2g/L, the result is accurate to 0.0001g/L; if the monomer aniline compound and the total aniline compound are If the mass concentration is greater than 0.2g/L, the result is accurate to 0.01g/L.

B.11 Precision and Bias

B.11.1 Precision

B.11.1.1 Overview: The precision of this method is in eight laboratories, and the range of the content of monomer aniline compounds in eleven gasoline is

Samples with 0.005g/L ~ 20.0g/L and total aniline compound content of 0.04g/L ~ 80.0g/L are obtained through collaborative experiments between laboratories;

The results of the collaborative test are statistically analyzed and calculated in accordance with the GB/T 6683 method. Determine the reliability of the test results according to the follo Level).

B.11.1.2 Repeatability: The difference between the two results of repeated measurements on the same sample by the same operator using the same instrument should not be greater that The repeatability value specified in.

B.11.1.3 Reproducibility: Different operators in different laboratories use different instruments to measure two single, independent results on the same sample.

The difference between the results should not be greater than the reproducibility value specified in Table B.6.

B.11.2 Deviation

Since there is no reference material used to determine the deviation, the deviation of this method cannot be determined.

Table B.6 Precision		τ	Unit is g/L	
Component	Content range	Repeatability (r)	Reproducibility (R)	
aniline	0.005 ~ 20.0	0.1480X 1.0148	0.3167X 0.9588	
N-methylaniline	0.005 ~ 20.0	0.1474X 0.9943	0.3127X 0.8983	
O/p-methylaniline	0.005 ~ 20.0	0.1183X 0.9651	0.2904X 0.9089	
M-methylaniline	0.005 ~ 20.0	0.1540X 0.9984	0.3161X 0.9185	
Ortho/meta/p-ethylaniline	0.005 ~ 20.0	0.1554X 0.9590	0.2618X 0.9082	
2,4/2,6/2,5/3,5-dimethylaniline	0.005 ~ 20.0	0.1590X 0.9671	0.2720X 0.9427	
2,3/3,4-Dimethylaniline	0.005 ~ 20.0	0.1500X 0.9700	0.2745X 0.9294	
Trimethylaniline	0.005 ~ 20.0	0.1217X 0.9471	0.2929X 0.9772	
Total Aniline Compounds	$0.040 \sim 80.0$	0.1553X 1.0555	0.3124X 0.9652	

Note: X is the average of the two results, and the unit is grans per liter (g/L).

20

Page 25

references

[1] GB 17930-2016 Motor gasoline

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GB 18351-20XX

twenty one