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NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA

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GB/T 14848-2017

Replacing GB/T 14848-1993

Standard for groundwater quality

地下水质量标准

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Foreword

This Standard is drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard replaces GB/T 14848-1993 "Quality standard for ground water". As compared with GB/T 14848-1993, in addition to editorial changes, the main technical changes are as follows:

- The water quality index is increased from 39 items of GB/T 14848-1993 to 93 items, an increase of 54 items;
- With reference to GB 5749-2006 "Standards for drinking water quality", groundwater quality indices are classified into regular and non-regular indices;
- The sensory traits and general chemical indices are increased from 17 items to 20 items, increasing the 3 indices of aluminum, sulfide, and sodium. USE oxygen consumption to replace permanganate index. REVISE the 4 indices of total hardness, iron, manganese, and ammonia nitrogen;
- The index of inorganic compounds in toxicological indices is increased from 16 items to 20 items, increasing the 4 indices of boron, antimony, silver, and thallium. REVISE the 11 indices of nitrite, iodide, mercury, arsenic, cadmium, lead, beryllium, barium, nickel, cobalt, and molybdenum;
- The index of organic compounds in toxicological indices is increased from 2 items to 49 items, adding trichloromethane, carbon tetrachloride, 1,1,1-trichloroethane, trichloroethylene, tetrachloroethylene, dichloromethane, 1,2-dichloroethane, 1,1,2-trichloroethane, 1,2-dichloropropane, tribromomethane, vinyl chloride, 1,1-dichloroethylene, 1,2-dichloroethylene, chlorine benzene, o-dichlorobenzene, p-dichlorobenzene, trichlorobenzene (total), benzene, toluene, ethylbenzene, xylene, styrene, 2,4-dinitrotoluene, 2,6-dinitrotoluene, naphthalene, anthracene, fluoranthene, benzo (b) fluoranthene, benzo (a) pyrene, polychlorinated biphenyl (total), γ -hexachlorocyclohexane (Lindan), hexachlorobenzene, heptachlor, atrazine, pentachlorophenol, 2,4,6-trichlorophenol, di (2-ethylhexyl) phthalate, carbofuran, aldicarb, dichlorvos, methyl parathion, malathion, dimethoate, chlorothalonil, 2,4-D, chlorpyrifos and glyphosate. DDT and hexachlorocyclohexane are replaced by DDT (total) and hexachlorocyclohexane (total), respectively, and revised;
- The total α radioactivity in the radioactive index is revised;
- REVISE the relevant provisions of the comprehensive assessment of groundwater quality.

Standard for groundwater quality

1 Scope

This Standard specifies the classification, indices, and limits of groundwater quality, groundwater quality survey and monitoring, and groundwater quality assessment, etc.

This Standard applies to groundwater quality survey, monitoring, assessment, and management.

2 Normative references

The following documents are indispensable for the application of this document. For the dated references, only the editions with the dates indicated are applicable to this document. For the undated references, the latest edition (including all the amendments) are applicable to this document.

GB 5749-2006 Standards for drinking water quality

GB/T 27025-2008 General requirements for the competence of testing and calibration laboratories

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Groundwater quality

A general term for the physical, chemical, and biological properties of groundwater.

3.2 Regular indices

Indices which reflect the basic conditions of groundwater quality, including sensory traits, general chemical indices, microbiological indices, common toxicological indices, and radioactive indices.

3.3 Non-regular indices

Groundwater quality indices, an extension of regular indices, which are determined according to regional and time differences or special circumstances.

They reflect major quality issues in groundwater, including relatively rare inorganic and organic toxicological indices.

3.4 Human health risk

The probability that various constituents in groundwater cause harm to human health.

4 Groundwater quality classification and indices

4.1 Groundwater quality classification

According to China's groundwater quality status and human health risk, with reference to drinking water, industrial, agricultural, and other water quality requirements, according to the content level of each constituent (except pH), it is classified into five classes.

Class I: Groundwater has a low chemical constituent content, suitable for various uses;

Class II: Groundwater has a lower chemical constituent content, suitable for various uses;

Class III: Groundwater has a medium chemical constituent content. Based on GB 5749-2006, it is mainly applicable to centralized drinking water sources and industrial and agricultural water;

Class IV: Groundwater has a higher chemical constituent content. Based on agricultural and industrial water quality requirements and a certain level of human health risk, it is applicable to agricultural and partial industrial waters; and after proper treatment, can be used as drinking water;

Class V: Groundwater has a high chemical constituent content. It should not be used as a drinking water source. Other water, according to the purpose of use, may be selected.

4.2 Groundwater quality classification indices

The groundwater quality indices are classified into regular indices and non-regular indices. The classification and limits are shown in Table 1 and Table 2 respectively.

5.5 Refer to Appendix B for the selection of groundwater quality testing methods. Before use, it shall, according to the requirements of 5.4 of GB/T 27025-2008, perform effective confirmation and verification.

6 Groundwater quality assessment

6.1 Groundwater quality assessment shall be based on groundwater quality testing data.

6.2 For the single-index assessment of groundwater quality, according to the limit value of the index value, the groundwater quality class is determined. When the index limits are the same, the superior shall prevail.

Example: The limits of Classes I and II of volatile phenols are both 0.001 mg/L. If the quality analysis result is 0.001 mg/L, it shall be classified as Class I, and not be classified as Class II.

6.3 Comprehensive assessment of groundwater quality shall be determined according to the worst class of the single-index assessment results. The worst-class indices shall be pointed out.

Example: A groundwater sample has a chloride content of 400 mg/L and a tetrachloroethylene content of 350 µg/L. These two indices belong to Class V. The remaining indices are lower than Class V. Then the comprehensive classification of the groundwater quality is Class V. Class V indices are chloride ion and tetrachloroethylene.

Table A.1 (continued)

S/N	Testing indices	Sampling container and volume	Preservation method	Preservation time
18	Ammonia nitrogen	G or P, 1 L	Original sample Or sulfuric acid, pH≤2, refrigerated at 4 °C	10 d 24 h
19	Sulfide	Brown G, 0.5 L	ADD 4 drops of zinc acetate solution (200 g/L) and sodium hydroxide solution (40 g/L) per 100 mL of water sample, protected from light	7 d
20	Sodium	G or P, 1 L	Original sample	10 d
21	Total coliform group	Sterilization bottle or sterilization bag	Original sample	4 h
22	Total number of colonies	Sterilization bottle or sterilization bag	Original sample	4 h
23	Nitrite	G or P, 1 L	Original sample Or sulfuric acid, pH≤2, refrigerated at 4 °C	10 d 24 h
24	Nitrate	G or P, 1 L	Original sample Or sulfuric acid, pH≤2, refrigerated at 4 °C	10 d 24 h
25	Cyanide	G, 1 L	Sodium hydroxide, pH≥12, refrigerated at 4 °C	24 h
26	Fluoride	G or P, 1 L	Original sample	10 d
27	Iodide	G or P, 1 L	Original sample	10 d
28	Mercury	G, 0.5 L	Nitric acid, pH≤2	30 d
29	Arsenic	G or P, 1 L	Original sample	10 d
30	Selenium	G, 0.5 L	Nitric acid, pH≤2	30 d
31	Cadmium	G, 0.5 L	Nitric acid, pH≤2	30 d
32	Chromium (hexavalent)	G or P, 1 L	Original sample	10 d
33	Lead	G, 0.5 L	Nitric acid, pH≤2	30 d
34	Total α radioactivity	P, 5 L	Original sample or hydrochloric acid, pH≤2	30 d
35	Total β radioactivity	P, 5 L	Original sample or hydrochloric acid, pH≤2	30 d
36	Beryllium	G, 0.5 L	Nitric acid, pH≤2	30 d
37	Boron	G or P, 1 L	Original sample	10 d
38	Antimony	G, 0.5 L	Nitric acid, pH≤2	30 d

Table A.1 (continued)

S/N	Testing indices	Sampling container and volume	Preservation method	Preservation time
61	O-dichlorobenzene	2×40 mL VOA brown G	ADD acid, pH<2, refrigerated at 4 °C	14 d
62	P-dichlorobenzene	2×40 mL VOA brown G	ADD acid, pH<2, refrigerated at 4 °C	14 d
63	Trichlorobenzene (total)	2×40 mL VOA brown G	ADD acid, pH<2, refrigerated at 4 °C	14 d
64	Ethylbenzene	2×40 mL VOA brown G	ADD acid, pH<2, refrigerated at 4 °C	14 d
65	Xylene (total)	2×40 mL VOA brown G	ADD acid, pH<2, refrigerated at 4 °C	14 d
66	Styrene	2×40 mL VOA brown G	ADD acid, pH<2, refrigerated at 4 °C	14 d
67	2,4-dinitrotoluene	2×1000 mL brown G	Refrigerated at 4 °C	7 d (extraction), 40 d
68	2,6-dinitrotoluene	2×1000 mL brown G	Refrigerated at 4 °C	7 d (extraction), 40 d
69	Naphthalene	2×1000 mL brown G	Refrigerated at 4 °C	7 d (extraction), 40 d
70	Anthracene	2×1000 mL brown G	Refrigerated at 4 °C	7 d (extraction), 40 d
71	Fluoranthene	2×1000 mL brown G	Refrigerated at 4 °C	7 d (extraction), 40 d
72	Benzo (b) fluoranthene	2×1000 mL brown G	Refrigerated at 4 °C	7 d (extraction), 40 d
73	Benzo (a) pyrene	2×1000 mL brown G	Refrigerated at 4 °C	7 d (extraction), 40 d
74	Polychlorinated biphenyl (total)	2×1000 mL brown G	Refrigerated at 4 °C	7 d (extraction), 40 d
75	Di (2-ethylhexyl) phthalate	2×1000 mL brown G	Refrigerated at 4 °C	7 d (extraction), 40 d
76	2,4,6-trichlorophenol	2×1000 mL brown G	Refrigerated at 4 °C	7 d (extraction), 40 d
77	Pentachlorophenol	2×1000 mL brown G	Refrigerated at 4 °C	7 d (extraction), 40 d
78	Hexachlorocyclohexane (total)	2×1000 mL brown G	Refrigerated at 4 °C	7 d (extraction), 40 d
79	γ-hexachlorocyclohexane (Lindan)	2×1000 mL brown G	Refrigerated at 4 °C	7 d (extraction), 40 d
80	DDT (total)	2×1000 mL brown G	Refrigerated at 4 °C	7 d (extraction), 40 d

Appendix B

(Informative)

Recommended analysis methods for groundwater quality testing indices

Recommended analysis methods for groundwater quality testing indices are shown in Table B.1.

Table B.1 -- Recommended analysis methods for groundwater quality testing indices

S/N	Testing indices	Recommended analysis methods
1	Color	Platinum-cobalt standard colorimetry
2	Odor and taste	SMELL and TASTE
3	Turbidity	Scattering method, turbidimetry
4	Substance visible to the naked eye	Direct observational method
5	pH	Glass electrode method (Testing is required both on-site and in laboratory)
6	Total hardness	EDTA volumetry, inductively coupled plasma atomic emission spectrometry, inductively coupled plasma mass spectrometry
7	Total dissolved solids	Dry gravimetric method at 105 °C, dry gravimetric method at 180 °C
8	Sulfate	Barium sulfate gravimetric method, ion chromatography, EDTA volumetry, barium sulfate turbidimetry
9	Chloride	Ion chromatography, silver nitrate volumetry
10	Iron	Inductively coupled plasma atomic emission spectrometry, atomic absorption spectrometry, spectrophotometry
11	Manganese	Inductively coupled plasma atomic emission spectrometry, inductively coupled plasma mass spectrometry, atomic absorption spectrometry
12	Copper	Inductively coupled plasma mass spectrometry, atomic absorption spectrometry
13	Zinc	Inductively coupled plasma mass spectrometry, atomic absorption spectrometry
14	Aluminum	Inductively coupled plasma atomic emission spectrometry, inductively coupled plasma mass spectrometry
15	Volatile phenols	Spectrophotometry, bromination volumetry
16	Anionic surfactant	Spectrophotometry
17	Oxygen consumption (COD _{Mn} method)	Acidic permanganate method, alkaline permanganate method

Table B.1 (continued)

S/N	Testing indices	Recommended analysis methods
45	Trichloromethane	Purge-trap/gas chromatography-mass spectrometry Headspace/gas chromatography-mass spectrometry
46	Carbon tetrachloride	
47	Benzene	
48	Toluene	
49	Dichloromethane	
50	1,2-dichloroethane	
51	1,1,1-trichloroethane	
52	1,1,2-trichloroethane	
53	1,2-dichloropropane	
54	Tribromomethane	
55	Vinyl chloride	
56	1,1-dichloroethylene	
57	1,2-dichloroethylene	
58	Trichloroethylene	
59	Tetrachloroethylene	
60	Chlorobenzene	
61	O-dichlorobenzene	
62	P-dichlorobenzene	
63	Trichlorobenzene (total)	
64	Ethylbenzene	
65	Xylene (total)	
66	Styrene	
67	2,4-dinitrotoluene	Gas chromatography-electron capture detector method Gas chromatography-mass spectrometry
68	2,6-dinitrotoluene	
69	Naphthalene	Gas chromatography-mass spectrometry High performance liquid chromatography-fluorescence detector-ultraviolet detector method
70	Anthracene	
71	Fluoranthene	
72	Benzo (b) fluoranthene	
73	Benzo (a) pyrene	
74	Polychlorinated biphenyl (total)	Gas chromatography-electron capture detector method Gas chromatography-mass spectrometry
75	Di (2-ethylhexyl) phthalate	Gas chromatography-electron capture detector method Gas chromatography-mass spectrometry High performance liquid chromatography-ultraviolet detector method
76	2,4,6-trichlorophenol	
77	Pentachlorophenol	
78	Hexachlorocyclohexane (total)	Gas chromatography-electron capture detector method Gas chromatography-mass spectrometry
79	Hexachlorocyclohexane (total)	

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