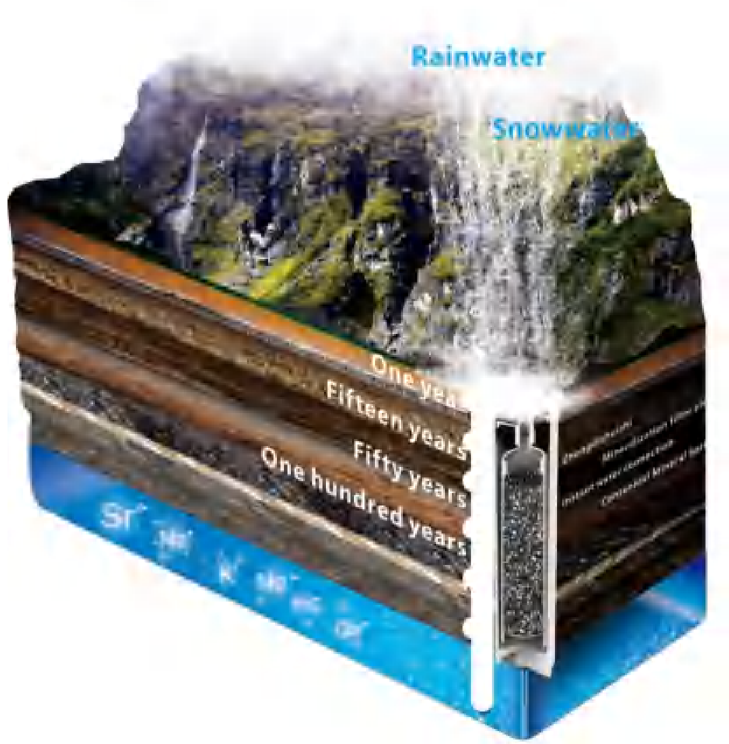
Mineralization Tech, Reconstitute Natural Mineral Water



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中地水石
ZhongdiShuishi

Mineralization Tech, Reconstitute Natural Mineral Water

Wuhan Zondy W&R Environmental Technology Co.,Ltd.

Mineralization Cartridge System Solution Provider

About Us

Wuhan Zondy W&R Environmental Technology Co., Ltd. is a national high-tech enterprise located in Wuhan, China, specializing in the research and development of drinking water mineralization technology and is currently the first brand in the field of drinking water mineralization in China.

Most of our R&D team members come from China University of Geosciences (Wuhan), which is the most authoritative school of geology in China and is also world-renowned. By simulating the formation of natural mineral water, we have creatively developed ROCK-ACTIVATION+ and element proportioning technologies, which can achieve mineral water from pure water with a small natural rock mineralization filter element.

We utilize pure natural rock materials without any chemical additions, which is entirely different from traditional mineralizing materials and is a groundbreaking technological innovation that has received several invention patents.

Pure water can be turned into weak alkaline water, high alkaline water, strontium-rich mineral water, zinc-rich mineral water, lithium-rich mineral water, mineral water with metasilicic acid, high TDS mineral water, etc., through our natural rock mineralization filter element, which is safe and healthy for drinking.

Our products have been certified by NSF for the safety of water-related products, the third-party agency SGS for product functionality .

In the Chinese market, our products have been supplied to famous international companies such as Haier, Midea, Xiaomi, Philips, Rinnai, Westinghouse, etc. We also have been serving serve most Chinese water purification companies such as Angel, LEXY, Qingyuan,etc.

NSF RoHS REACH

R&D PLATFORM

The company's laboratory has cumulatively invested 5 million yuan in total for research and development equipment, with comprehensive rock and water quality analysing and testing capabilities.

Rock analysing equipments

X-ray Fluorescence Spectrometer
X-ray Diffractometer
Microwave Digestion Instrument

Water analysing equipments

Inductively coupled plasma-Mass Spectrometer
Ion Chromatograph
Liquid Chromatograph
Ultraviolet Spectrophotometer

CERTIFICATES

Alkaline series products have been NSF42 certified.

Alkaline series carbon blocks/Strontium-rich mineralizing carbon blocks/Zinc-rich mineralizing carbon blocks have passed RoHS and REACH test.

NSF International
789 N. Dixboro Road, Ann Arbor, MI 48105 USA

RECOGNIZES

Wuhan Zondy W&R Environmental Technology Co., Ltd.
China

AS COMPLYING WITH NSF/ANSI 42 AND ALL APPLICABLE REQUIREMENTS PRODUCTS APPEARING IN THE NSF OFFICIAL LISTING ARE AUTHORIZED TO BEAR THE NSF MARK.

Third-generation mineralization technology: Simulating the quality water formation process of high-quality water sources

The water quality of high-quality water sources is an advanced standard for pursuing healthy drinking water. This model involves field investigations to identify high-quality water sources, followed by sampling to study the hydrogeochemical characteristics and mechanisms of water quality evolution at these sites. Rocks are subsequently characterized and modified based on these studies, and the mineralization filter model is refined through extensive numerical and physical simulation experiments. This process enables the transport of healthy water from high-quality sources directly to consumers' homes.

Fig.2 Piper diagrams for groundwater samples from exposed and buried karst regions in Bama Yao Autonomous County

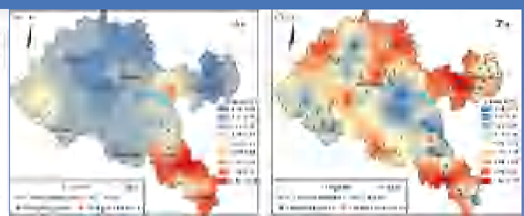

Fig.3 The spatial distribution of Sr(a) and Zn(b) in groundwaterof Bama Yao Autonomous County

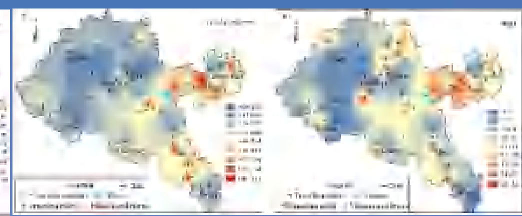

Fig.4 Spatial distribution of HI for children(a) and WQI values(b) of groundwater in Bama

As presented in the Piper diagram (Fig. 2), the hydrochemicaltype of groundwater in Bama was predominantly Ca/Mg–HCO_3.As illustrated in Fig. 3(a, b), the groundwater with the highest Sr content was mainly distributed in the southeastern part of the study area; Meanwhile, the spatial distribution of Zn concentration was extremely uneven throughout the study area.Fig. 4 presents the WQI and HI for groundwater samples in Bama Yao Autonomous County. All water samples had a WQI value that does not exceed 50, indicating excellent water quality. Higher HI values were primarily concentrated in the eastern part of the study area, whereas the western part exhibited lower HI values.

2 Study on hydrogeochemical characteristics

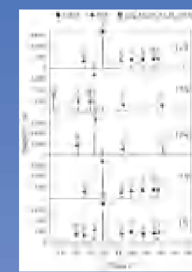

Fig. 7 XRD image of rocks from Bama Yao Autonomous County

Table 1 Overview of pore volume and specific surface area of rocks before and after modification

	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
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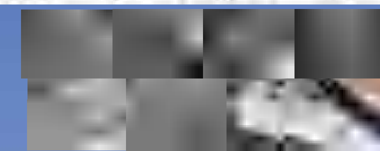


Fig.8 Photographs of rock samplesin Bama Yao Autonomous County and their SEM images before and after modification

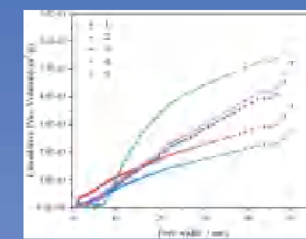


Fig.9 Pore size distribution of the rocks before and after modification

Four different methods were applied to modify rock No. 4. The resulting SEM images and pore size distribution before and after the modification are displayed in Figure 8 and 9, whereit is evident that the rock has a more pronounced pore structure after modification.

4 Characterization and modification of rocks

1 Field exploration to identify high-quality water sources

A total of 93 water samples were collected from 10 townships in Bama Yao Autonomous County . After pretreatment of the samples, tests and analyses foranions, cations and isotopes were carried out.

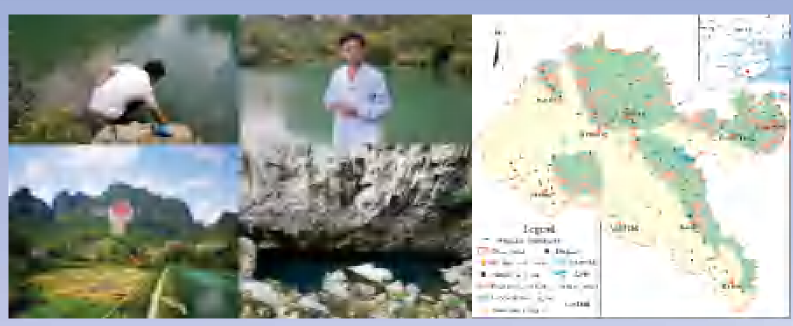


Fig.1 Field investigation photos and a map showing the distribution of sampling points in Bama Yao Autonomous County

3 Study on the mechanisms of water quality evolution

The quality of groundwater in Bama is primarily controlled by the weathering of calcite, supplemented by the weathering of silicate rocks and cation exchange adsorption, which also influence its characteristics (Fig. 5). The Sr in groundwater in BKR predominantly originates from the weathering of celestite and strontianite in Triassic mudstones and marl. The high concentrations of Zn likely result from the weathering of lead-zinc deposits in Indosinian period intrusive diabase.

Fig.5 Ion ratios in groundwater in Bama Yao Autonomous County

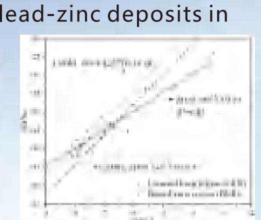


Fig.6 The relationship betweenδ18Oand δD in shallow groundwater of Bama Yao Autonomous County

5 Physical simulation and developmentof filter element

It can be seen in Fig. 11 that the concentrations of Li, Na, Mg, K, Ca, Zn, and Sr in the effluent increased after modification compared to their unmodified state. The respective increases were 0.01–0.1 mg/L for Li, 0.6–22 mg/L for Na, 0.1–13 mg/L for Mg, 0.5–18 mg/L for K, 10–40 mg/L for Ca, 0.04–0.3 mg/L for Zn, and 17–41 mg/L for Sr.

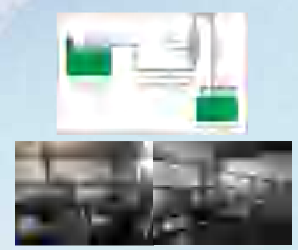


Fig.10 Diagram of the column experimental setup

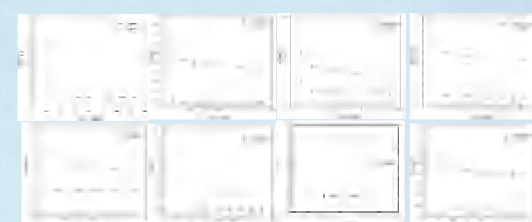
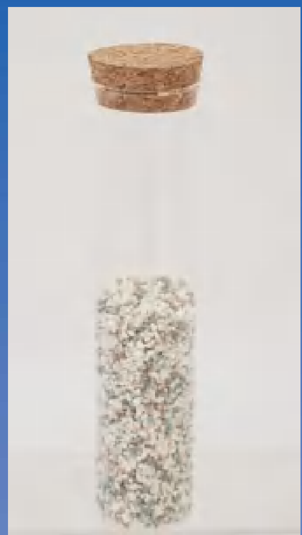


Fig.11 Breakthrough curves of TDS, Ca, K, Mg, Na, Li, Sr, Zn in effluent before and after rock modification

Weak alkaline mineralizing granule filter



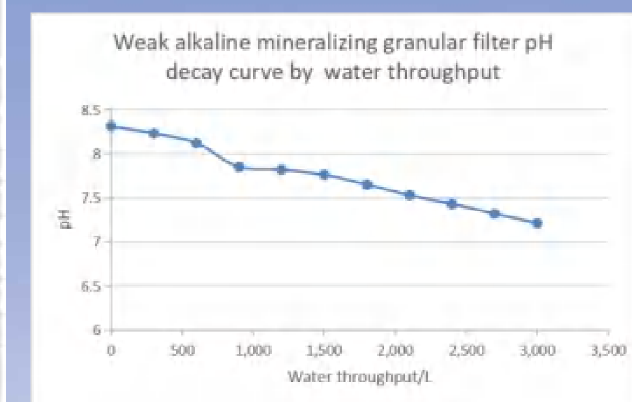
weak alkaline mineralizing granular filter media

weak alkaline mineralizing granule filter

Function testing

Connect the weak alkaline mineralizing granular filter to the reverse osmosis water purifier for continuous water passage (TDS of pure water is 5mg/L, pH is 6.32), controlling the water flow rate into 1.5L/min, water temperature 25℃±3℃, rinse 30min and start timing, taking a water sample test every 500L of water.

Water throughput/（L）	Total dissolved solids/（mg/L）	pH
0	18	8.31
300	17	8.23
600	17	8.12
900	16	7.85
1200	15	7.82
1500	15	7.76
1800	14	7.65
2100	13	7.53
2400	13	7.43
2700	12	7.32
3000	11	7.21



Effect

Adjusting the pH of the water/ Adjusting the texture of water

Weak alkaline mineralizing carbon block filter

weak alkaline mineralizing powdery filter media

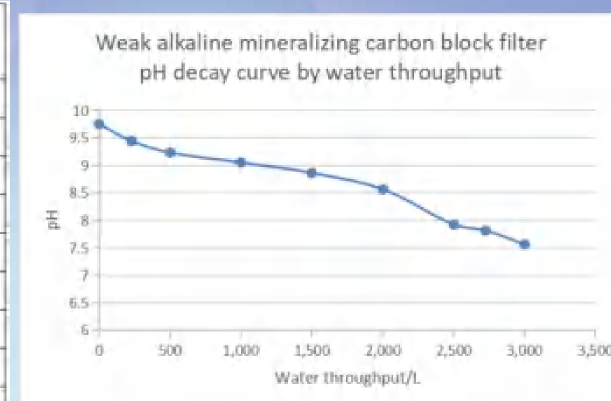
weak alkaline mineralizing carbon block

weak alkaline mineralizing carbon block filter

Function testing

Connect the weak alkaline mineralizing carbon block filter to the reverse osmosis water purifier for continuous water passage (TDS of pure water is 5mg/L, pH is 6.32), controlling the water flow rate into 1.5L/min, water temperature 25℃±3℃, rinse 30min and start timing, taking a water sample test every 500L of water.

Water throughput/（L）	Total dissolved solids/（mg/L）	pH
0	22	9.75
230	20	9.44
500	18	9.23
1000	18	9.05
1500	17	8.86
2000	17	8.56
2500	16	7.92
2725	15	7.81
3000	14	7.56



Effect

Adjusting the pH of the water/ Adjusting the texture of water

Alkaline mineralizing carbon block filter

alkaline mineralizing powdery filter media

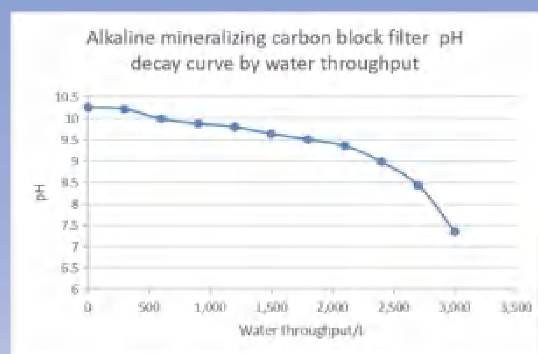
alkaline mineralizing carbon block

alkaline mineralizing carbon block filter

Function testing

Connect the alkaline mineralizing carbon block filter to the reverse osmosis water purifier for continuous water passage (TDS of pure water is 7mg/L, pH is 6.3), controlling the water flow rate into 2.0L/min, water temperature 25℃±3℃, rinse 30min and start timing, taking a water sample test every 300L of water.

Water throughput/ (L)	Total dissolved solids/ (mg/L)	pH
0	31	10.25
300	30	10.21
600	27	9.98
900	25	9.87
1200	21	9.79
1500	20	9.63
1800	18	9.5
2100	18	9.35
2400	14	8.98
2700	13	8.43
3000	11	7.34



Effect

Adjusting the pH of the water/ Adjusting the texture of water

High alkaline mineralizing carbon block filter

high alkaline mineralizing powdery filter media

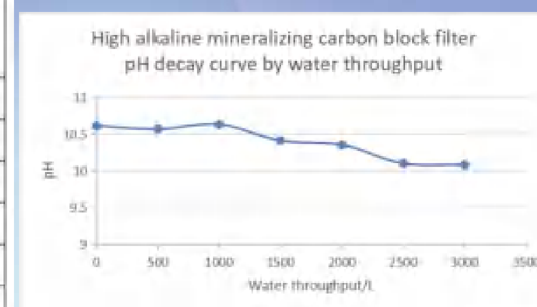
high alkaline mineralizing carbon block

high alkaline mineralizing carbon block filter

Function testing

Connect the high alkaline mineralizing carbon block filter to the reverse osmosis water purifier and pass water continuously (TDS of pure water is 5mg/L, pH is 6.3), controlling the water flow rate into 1.5L/min, water temperature 25℃±3℃, rinse for 30min and start timing, taking a water sample test every 500L of water.

Water throughput/ (L)	Total dissolved solids/ (mg/L)	pH
0	58	10.61
500	45	10.57
1000	44	10.63
1500	40	10.41
2000	29	10.35
2500	28	10.10
3000	27	10.08

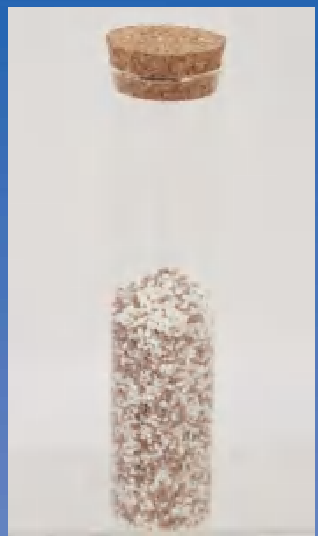


Effect

Adjusting the pH of the water/ Adjusting the texture of water

Product

Calcium and Magnesium mineralizing granule filter



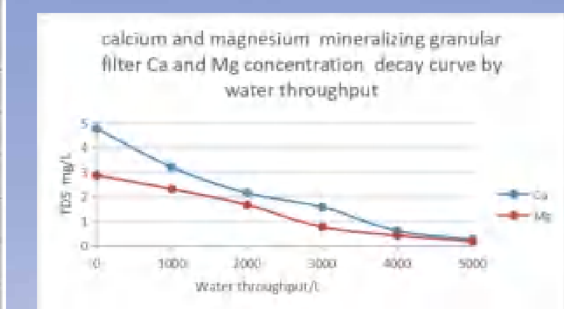
calcium and magnesium mineralizing granular filter media

calcium and magnesium mineralizing granule filter

Function testing

Connect the calcium and magnesium mineralizing granular filter to the reverse osmosis water purifier for continuous water passage (TDS of pure water is 3mg/L), controlling the water flow rate into 2.0L/min, water temperature 25℃±3℃, rinsing for 30min and then start timing, taking a water sample test every 500L of water.

Water throughput/ (L)	Calcium (mg/L)	Magnesium (mg/L)
0	4.78	2.88
1000	3.21	2.32
2000	2.16	1.67
3000	1.58	0.78
4000	0.62	0.43
5000	0.27	0.18



Effect

Increasing calcium and magnesium mineral concentration of water
Adjusting the texture of water

Calcium and Magnesium mineralizing carbon block filter

calcium and magnesium mineralizing powdery filter media

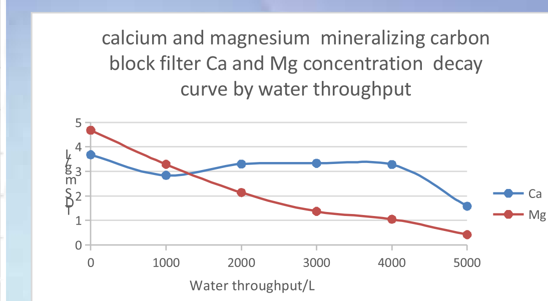
calcium and magnesium mineralizing carbon block

calcium and magnesium mineralizing carbon block filter

Function testing

Connect the calcium and magnesium mineralizing granular filter to the reverse osmosis water purifier for continuous water passage (TDS of pure water is 3mg/L), controlling the water flow rate into 2.0L/min, water temperature 25℃±3℃, rinsing for 30min and then start timing, taking a water sample test every 500L of water.

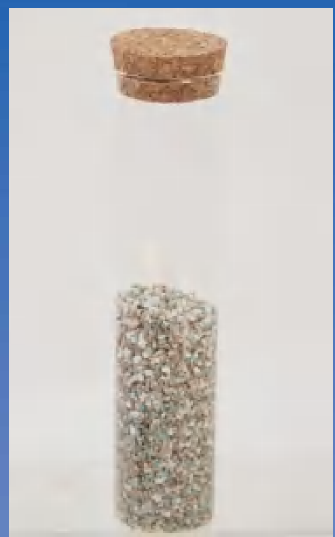
Water throughput/ (L)	Calcium (mg/L)	Magnesium (mg/L)
0	3.68	4.68
1000	2.84	3.29
2000	3.30	2.14
3000	3.33	1.37
4000	3.28	1.05
5000	1.58	0.42



Effect

Increasing calcium and magnesium mineral concentration of water
Adjusting the texture of water

Strontium-rich mineralizing granule filter



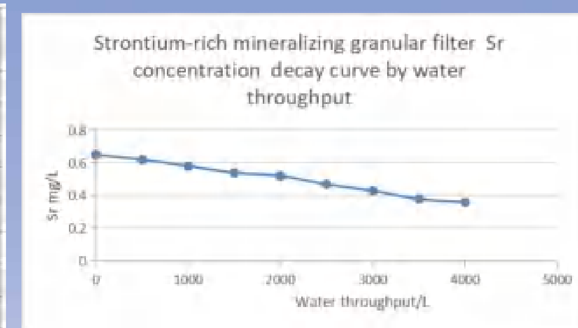
strontium-rich mineralizing granular filter media

strontium-rich mineralizing granule filter

Function testing

Connect the strontium-rich mineralizing granular filter to the reverse osmosis water purifier for continuous water passage (TDS of pure water is 4mg/L, strontium concentration is 0.01mg/L), controlling the water flow rate into 3.0L/min, water temperature 25℃±3℃, rinsing 30min and then start timing, taking a water sample test every 500L of water.

Water throughput/（L）	Total dissolved solids/（mg/L）	Sr（mg/L）
0	8	0.65
500	8	0.62
1000	7	0.58
1500	7	0.54
2000	7	0.52
2500	6	0.47
3000	6	0.43
3500	6	0.38
4000	6	0.36



Effect

The benefits of strontium element include enhancing bone strength, preventing dental decay and osteoporosis

Strontium-rich mineralizing carbon block filter

strontium-rich mineralizing powdery filter media

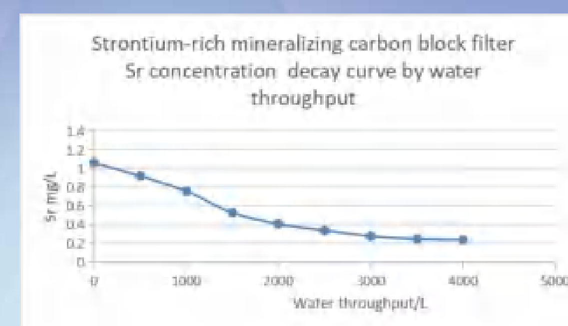
strontium-rich mineralizing carbon block

strontium-rich mineralizing carbon block filter

Function testing

Connect the strontium-rich mineralizing carbon block filter to the reverse osmosis water purifier for continuous water passage (TDS of pure water is 4mg/L, strontium concentration is 0.01mg/L), controlling the water flow rate into 3.0L/min, water temperature 25℃±3℃, rinsing 30min and then start timing, taking a water sample test every 500L of water.

Water throughput/（L）	Total dissolved solids/（mg/L）	Sr（mg/L）
0	7	1.06
500	5	0.92
1000	5	0.76
1500	5	0.53
2000	5	0.41
2500	5	0.34
3000	5	0.28
3500	5	0.25
4000	5	0.24



Effect

The benefits of strontium element include enhancing bone strength, preventing dental decay and osteoporosis

Zinc-rich mineralizing carbon block


zinc-rich mineralizing powdery filter media

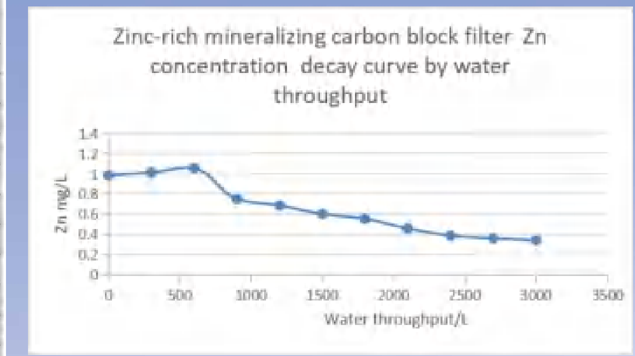

zinc-rich mineralizing carbon block


zinc-rich mineralizing carbon block filter

Function testing

Connect the zinc-rich mineralizing carbon block filter to a reverse osmosis water purifier for continuous water passage (TDS of pure water is 7mg/L,zinc concentration is 0mg/L), controlling the water flow rate into 2.0L/min, water temperature 25℃±3℃, rinsing 30min and then start timing, taking a water sample test every 300L of water.

Water throughput/ (L)	Total dissolved solids/ (mg/L)	Zn (mg/L)
0	17	0.986
300	12	1.015
600	10	1.058
900	11	0.751
1200	11	0.687
1500	11	0.603
1800	11	0.554
2100	11	0.46
2400	11	0.389
2700	11	0.363
3000	10	0.342



Effect

The benefits of zinc element include promoting the growth and development of children, improving appetite

High TDS mineralizing granule filter

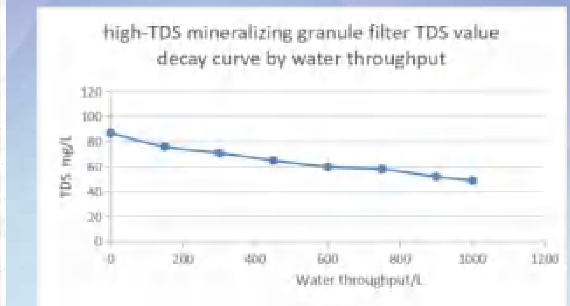

high-TDS mineralizing granular filter media


high-TDS mineralizing granule filter

Function testing

Connect the High TDS mineralizing granular filter to the reverse osmosis water purifier with continuous water passage (TDS of pure water is 2mg/L, pH is 5.96), controlling the water flow rate into 2.0L/min, water temperature 25℃±3℃, rinsing 30min and then start timing, taking a water sample test every 150L of water.

Water throughput/ (L)	pH	Total dissolved solids/ (mg/L)
0	6.34	87
150	6.22	76
300	6.21	71
450	6.20	65
600	6.18	60
750	6.18	58
900	6.17	52
1000	6.17	49



Effect

Increasing total dissolved solids of water
Provide water more suitable for coffee making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RESEARCH ARTICLE

Strontium in public drinking water and associated public health risks in Chinese cities

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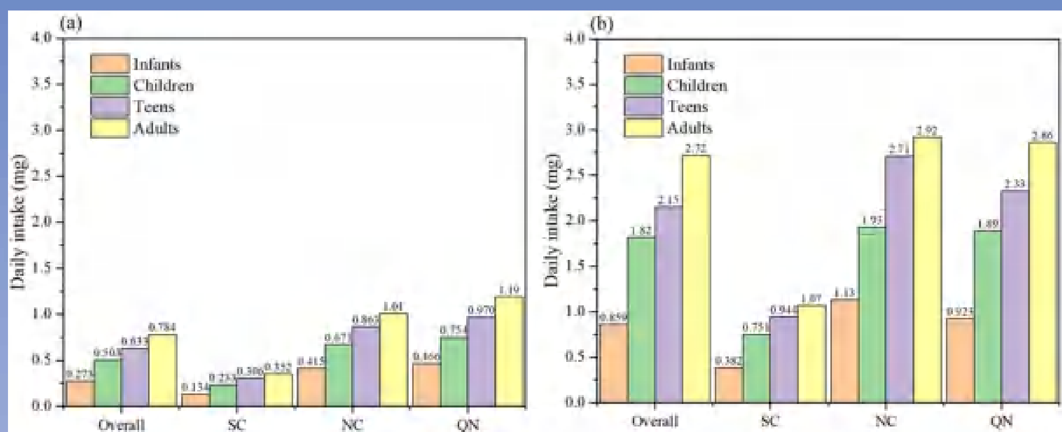
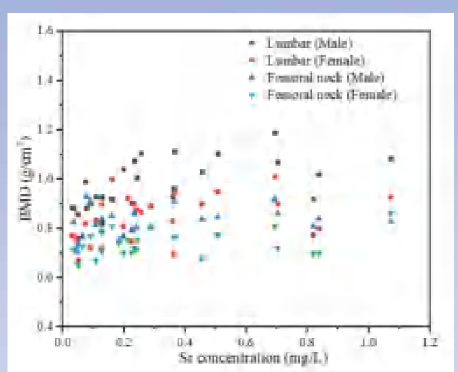
In general, the range of Sr concentration was 0.005–3.11 mg/L with a mean value of 0.360 mg/L.It was clear to see that the Sr concentration in public drinking water in Chinese cities presented geographically aggregated distribution. Sr level was relatively low in the southern region of the Yangtze River. Sr concentration was below 0.1 mg/L in most cities except the middle part of Guizhou province (Sr concentration was above 0.5 mg/L).Sr concentration in the cities along the Yangtze River was mostly between 0.2 and 0.3 mg/L. Cities in which Sr concentration was above 0.5 mg/L were found in the Yellow River Basin and Xinjiang. Sr concentration was higher in the northwest than in the southeast.



In general, the average Sr intakes of infants, children,teens, and adults through public drinking water were 0.273,0.503, 0.633, and 0.784 mg/day.Based on the intakes from various countries, the Sr intake from public drinking water accounts for 24–41% of the total daily intake of Sr for an adult in China. As you see, public drinking water is one of the most important ways to get Sr.



The elderly people from the cities with a lower Sr concentration had a lower BMD in the lumbar spine and femoral neck bone. The correlation between Sr concentration in drinking water and the BMD of the lumbar spine was stronger than that between Sr concentration and the BMD of the femoral neck bone. It is generally believed that the calcium (Ca) in drinking water is the main factor affecting bone mineral density . However, the correlation coefficients of Sr were higher than that of Ca (except for the femoral neck BMD (Female)). As a result, the Sr in drinking water cannot be ignored in the prevention of osteoporosis.

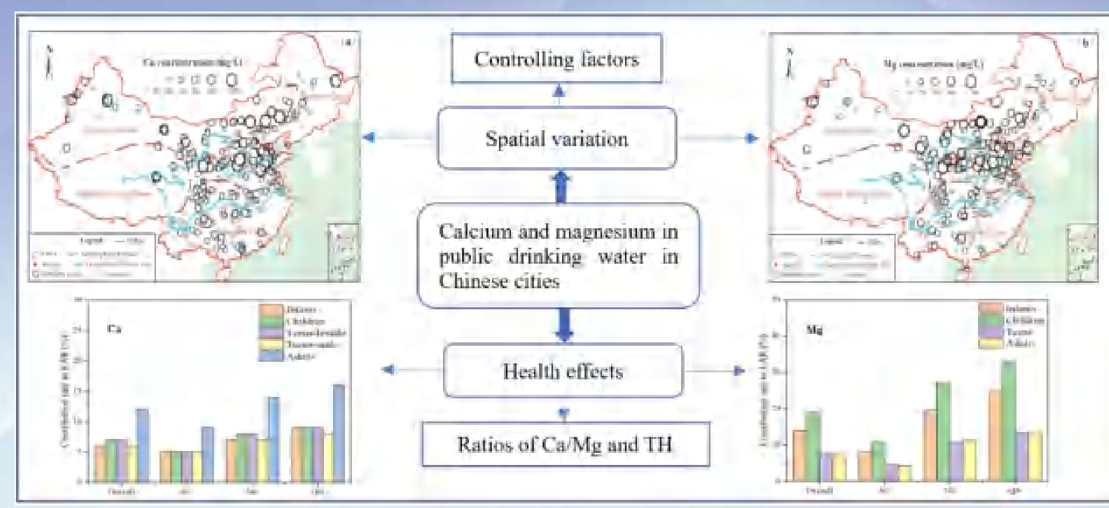
Calcium (Ca) and magnesium (Mg) in drinking water and the relevant health effects have been ignored for too long. This study aims to reveal theconcentrations, spatial distributions, origins and contributions to the daily estimated average requirements of Ca and Mg in public drinking water. Using hydrochemical data from collected samples of public drinking water in 314 cities across China, the contributions of Ca and Mg intakes from public drinking water to their daily estimated average requirements (EARs) were assessed. The Ca and Mg concentrations of the samples were in the range of 2.5–155.1 mg/L and 0.2–81.9 mg/L, with an average of 40.4 mg/L and 12.4 mg/L, respectively. There exist obvious differences in Ca and Mg concentrations in different regions, under the impact of climate conditions and water–rock interactions. The intake of Ca via the consumption of public drinking water for adults may be twice as much as that for other age groups.In cities with high Ca levels in public drinking water, the Ca contributions to EAR could reach upto 51.59% for adults. By contrast, Mg in drinking water is an important and even the main pathway to ingest Mg for infants and children. Therefore, public drinking water is critical for Ca and Mg intake among urban residents of China.


Environ Geochem Health

ORIGINAL PAPER

Calcium and magnesium in China's public drinking water and their daily estimated average requirements

Hao Peng · Taotao Lu · Shuang Xiong · Aira Sarha Nadine Ferrer · Yanxin Wang



Paper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ELSEVIER

Research article

Trace elements in public drinking water in Chinese cities: Insights from their health risks and mineral nutrition assessments

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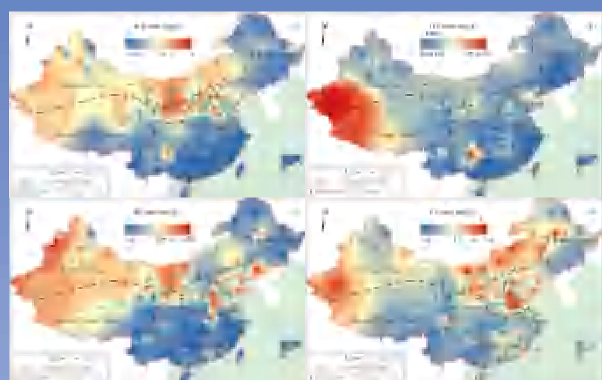
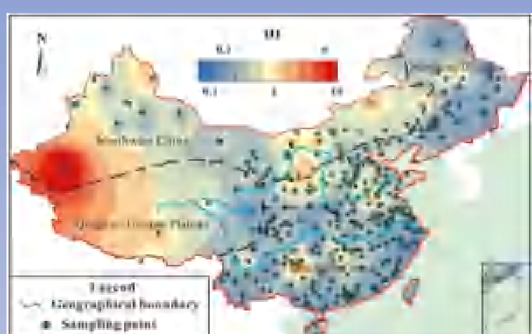
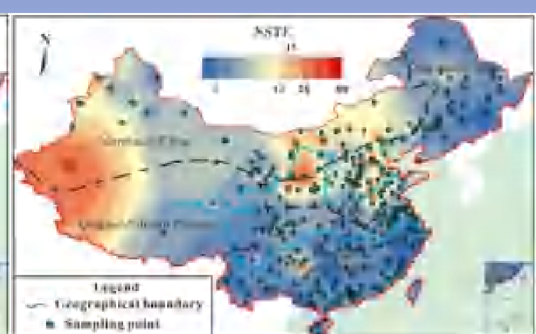
In summary, public drinking water is an important pathway for the intakes of F⁻, Sr, Mo, Li, V, B, Se, and Cr, especially for F⁻ and Sr. For cities with high Zn content in public drinking water, the Zn intake for children should not be ignored. The average contributions of Sr, Li, V, Rb and B to their average daily intakes were 38.84%, 3.08%–9.25%, 5.00%–15.00%, 0.06%–0.32% and 7.53%.







The NSTE was low in SC (except for Guizhou Plateau) and the northeast part of NC, which means the contributions of trace elements are low in these regions. Meanwhile, the HI values in these areas were also low. Long-term consumption of drinking water with low NSTE will make it difficult for people to obtain enough trace elements to maintain metabolic balance in the human body. As a result, attention should be focused on the nutritional balance of trace elements for the local residents in these areas. Drinking water is the cheapest and most widely accessible approach to supplement trace elements . Areas with low trace elements level in public drinking water should take measures to increase the trace element contents. For instance, Rosborg proposed that drinking water with fewer trace elements should be remineralized before supply.

Patent

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