
Ordinary PVDF ultrafiltration
membrane ultrafiltration membrane
across the multipurpose

2018 Asian Clean Water Summit Forum



Personal introduction



Chairman of Ningbo
Dukang Ceramics Co.,
Ltd.—Du Jianyao
Phone:13968268096



Part 1

Foreword



Part 2

New technologies attempt



Part 3

Direction outlook

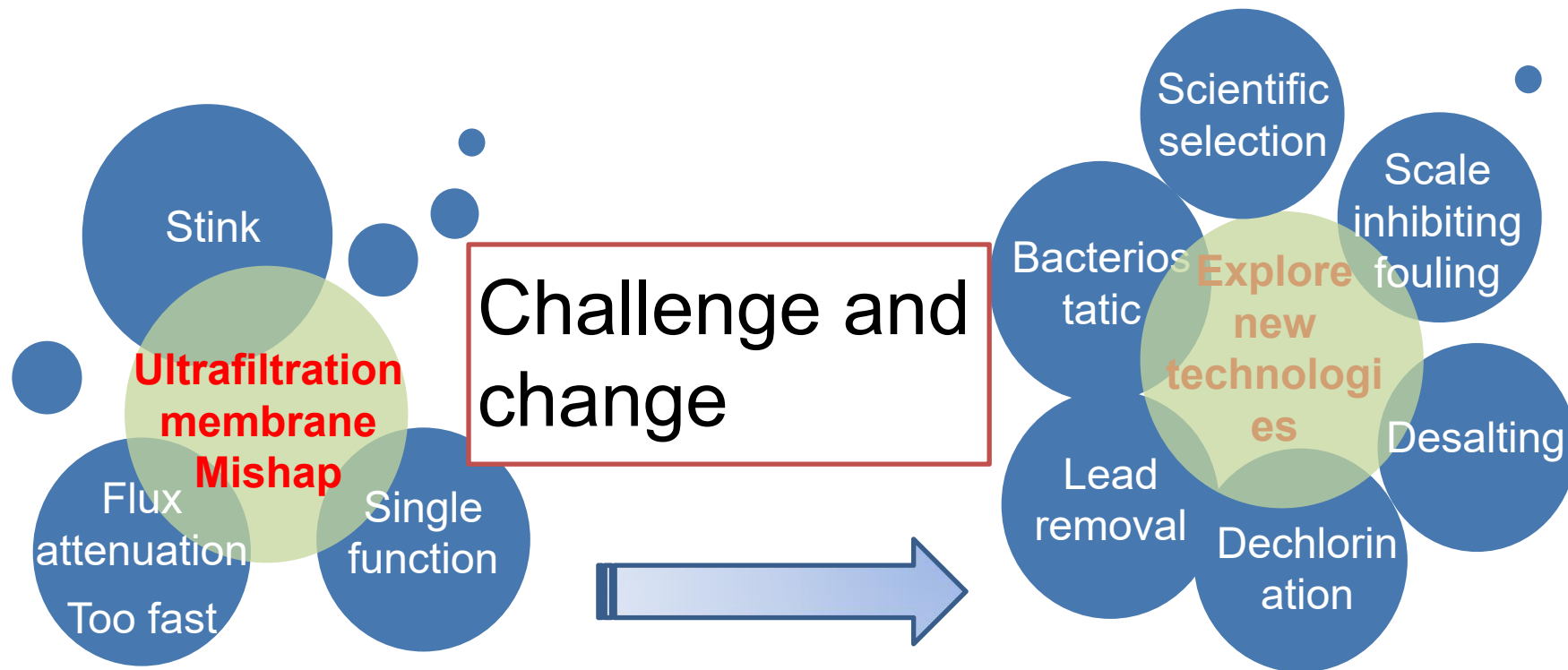
**The miniaturization of the water purifier will be an unavoidable trend in the long-term water purification technology!
To solve the problem of miniaturization, scientific and reasonable reduction of the number of filter elements is the most effective means.**

Generally available technical route:

Material conformity - one level alternative to multiple levels;

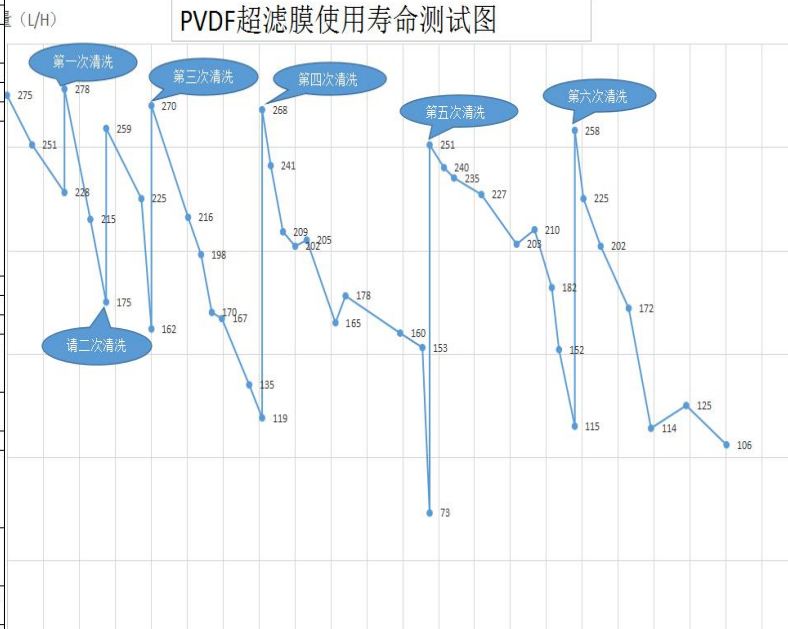
Functional compliance - an alternative to a variety;

- Ultrafiltration membrane is one of the best carriers to achieve "an alternative."



One of the changes: Scientific material selection + optimization process - PVDF

Test results					
No.	Test items	Detection method	actual data		
1	E. coli removal rate	E. coli 8088 strain, spiked concentration 200-2000 cfu/100ml, 100%	Standard water	filtered water	Removal rate
			1560	0	100%
2	Flux (L/h)	Inlet pressure 0.2MPa, 2 in and out >240	initial	258	
			Empty bottle	290	
3	Total water purification performance (stain resistance)	The flux size is attenuated to 30% of the nominal value of 100 tons of purified water (washing 6 times)	Detailed data Annex A		
4	Oxidation resistance	Soaking solution residual oxygen 1000m, sealed soaked 24H, no change in performance, and test its bacterial interception test	Before soaking	Product flux	Stretch
			After soaking	258	200%
				249	200%
			Bacterial interception	Standard water cfu/ml	Filtrate cfu/ml
			Before soaking	8600	0
			After soaking	15600	0
5	Transmembrane pressure difference	<0.05 MPa pressure when standard total clean water flux knot east	0.05MPa		
6	Compressive strength	Maintain normal operation, the maximum pressure difference across the membrane allowed >0.4MPa	0.6		
7	Run-in period	Minimum flushing volume (COD) to meet the standard requirements for MOH 24H immersion test	product	Raw water	Sample water
			Membrane assembly	0.15	1.11
					increments
					0.96
			The membrane module was immersed in pure water for 0.5 h at a flow rate of 3 L/min and soaked for 24H. The membrane module package area was 1 m2.		



The second change - antibacterial attempt Ti-PVDF

Titanium dioxide modified PVDF
membrane - Ti-PVDF

Technical principle:

1. Titanium dioxide super material is modified by biomaterials using natural inorganic raw materials.
2. Each molecule has a weak electric field
3. The water flow generates pressure, activates the molecular electrode, partially decomposes H₂O, forms [OH]⁻, and is safe and efficient by [OH]⁻-bacteriostatic
4. The service life is up to 3-5 years

Antibacterial performance test

Sample giver	Du Feng	Sample date	2018/1/10	Date of completion	2018/1/11	
Soak test data						
Serial number	Sample category	Number of raw water colonies (cfu/ml)	Number of colonies after 24 hours of raw water placement (cfu/ml)	Soaking sample water colony number (cfu/ml)	Bacteriostatic rate	Sterilization rate
Membrane wire	4%	9900	16530	12800	56.26%	
	1.00%	9900	16530	8900		10.10%
	1.50%	9900	16530	3700		62.63%

The second change - antibacterial attempt Ti-PVDF

Sample processing	3 groups of ultrafiltration pure water for 0.5h, the standard water was filtered by ultrafiltration to take 50ml of water, and pure water 500ml was sealed in a small filter bottle at 1:10 for 24h, then tested the initial bacterial colony number and then ran 7 tons of dechlorinated tap water. The number of bacterial colonies was tested again as described above.					
Soak test						
No.		Number of raw water colonies (cfu/ml)	Number of colonies after 24 hours of raw water placement (cfu/ml)	Soaking sample water colony number (cfu/ml)	Bacterio static rate	Steriliz ation rate
Initial: 1:10 ratio soaking solution of filtered liquid and pure water	ordinary	3970	6600	6500	3.80%	
	1.50%	3970	6600	100		
	4%	3970	6600	2000		97.48%
Number of colonies in the bottle after running 7 tons of water	ordinary	50000				49.62%
	1.50%	1600				
	4%	21000				
After running 7 tons. 1:10 ratio soaking solution of filtered solution and pure	ordinary	11000	14000	13000	33.33%	
	1.50%	11000	14000	164		98.51%
	4%	11000	14000	5500		50%

The water filtered by the antibacterial ultrafiltration membrane has a continuous antibacterial function

The second change - antibacterial attempt Ti-PVDF

I: Application of ultrafiltration machine
Excellent anti-odor performance, completely solve the problem of odor of ultrafiltration machine

filtering 7 tons of water from dechlorination tap water, the ultrafiltration membrane module filter bottle is sealed in

No.	Sample category	7 days of colonies on January 30 (cfu/ml)	14 days of colonies (cfu/ml)			
Ultrafiltration	ordinary	14000	20000			
	1.00%	4000	1000			
	1.50%	400	120			

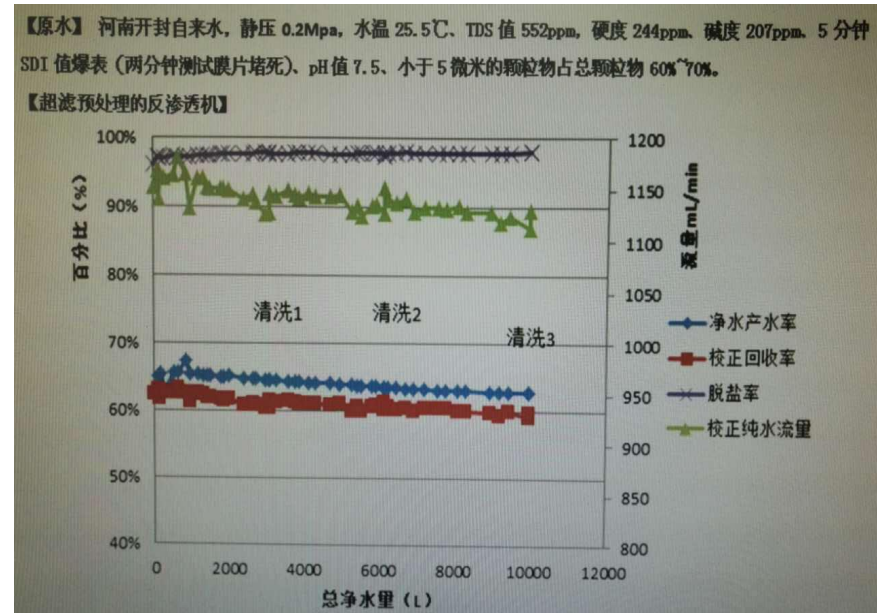
脱氯自来

The second change - antibacterial attempt Ti-PVDF

II: Application of RO machine

To achieve the first-order water efficiency, the concentrated water reuse and two-stage reverse osmosis membrane technology are generally used, but both methods are at the expense of the service life of the RO membrane. If the ultrafiltration membrane is used as the pretreatment of the RO, although 采用 concentrated water reflux, two-stage RO membrane to achieve first-class water efficiency, and also achieve normal life of RO

1. It can retain the colloid and prevent colloidal deposits on the surface of the Ro film.
2. It is to retain bacteria and inhibit bacterial growth, preventing the formation of biofilm on the surface of Ro film.
3. It is to prevent scaling. The reason is that when the ultrafiltration membrane removes the colloid and the suspended solids in the water, when the calcium and magnesium ions form crystals, due to the lack of scale-forming condensation nuclei, only a small amount of visible loose scale can be produced (ultrafiltration machine). The reason for the white floating material in the area of high hardness water) It is easy to rinse off when the Ro film is washed, thus prolonging the service life of the RO film.



The third change - the attempt to remove lead C-PVDF

Test method:

lead removal rate: refer to MOH "Standard for reverse osmosis treatment of sanitary safety and function evaluation of drinking water quality processor" & GB/T5750.6-2006 inductively coupled plasma mass spectrometry ICPMS

Test Results:

1. Water begins					
Test items	unit	Test Methods	Test Results	Filtered water	Removal rate (%)
			Add raw water	< 0.0005	>99.1
lead	Mg/L	GB/T 5750.6-2006	0.0579		
2. Water 500L					
Test items	unit	Test Methods	Test Results	Filtered water	Removal rate (%)
			Add raw water	< 0.0005	>99.1
lead	Mg/L	GB/T 5750.6-2006	0.0561		
3. Water supply 1000L					
Test items	unit	Test Methods	Test Results	Filtered water	Removal rate (%)
			Add raw water	0.0009	98.3
lead	Mg/L	GB/T 5750.6-2006	0.0531	0.0009	98.3



The fourth of the change - chlorine-inhibiting Ti-C-PVDF



Test results									
No.	Test items	Detection method	standard	actual data					determin ation
1	Initial flow rate (L/h)	《DK-WI-PG-005》 5.5.2.1	≥240	260					OK
2	Over ink	《DK-WI-PG-005》		Clear water					OK
3	* Total number of colonies (cfu/ml)	《DK-WI-PG-005》 5.5.2.3	≥20						
4	*Water turbidity (NTU)	《DK-WI-PG-005》 5.5.2.4	≤1						
5	*COD increase (mg/L)	《DK-WI-PG-005》 5.5.2.5	≤1						
6	*Life (L)	《DK-WI-PG-005》	5000						
7	Initial residual chlorine removal rate	《DK-WI-PG-005》	≥90%		Flow rate	Raw water	After removal	Removal rate	OK
				1#	120	1.98	0.13	93.43%	
				2#	120	1.98	0.11	94.44%	
Life data record									
No.	Water meter reading	Water flow range (T)	Flow rate	Raw water	After removal		Removal rate		determin ation
1#	149.0689	0.4	120	1.98	0.16		91.91%		OK
	149.7415	1.2	120	2.03	0.15		92.61%		
Test date	2017/12/8		Date of completio	2017/12/13					

No.	Sample category	Number of raw water colonies (cfu/ml)	Number of colonies after 24 hours of raw water placement (cfu/ml)	Soaking sample water colony number (cfu/ml)	Bacteriostatic rate	Sterilization rate
Ultrafiltration	3%+Bacteriostatic	265	530	187		70.57%

The fifth of change - chlorine and bacteriostatic PVDF

Ultrafiltration machine:

1. Can eliminate the charcoal after installation, making the model structure more compact
2. Ultrafiltration filter will not stink

RO machine:

1. No black water
2. Adsorption pressure barrel odor
3. The effluent bacteria do not exceed the standard

Our efforts are:

- 1, scale inhibition and descaling - the wider application of ultrafiltration
- 2, ultrafiltration nanofiltration - the ultimate technology of the whole house purification
- 3, more efficient and cost-optimized - comprehensive promotion of the popularization of water purifiers

.....

Thank you!



2018 Asian Clean Water Summit Forum