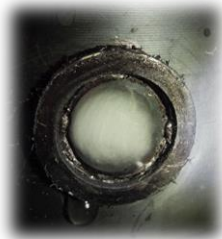


KINETIC REACTOR KR-T

Blue Paper
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KINETIC TECHNOLOGY

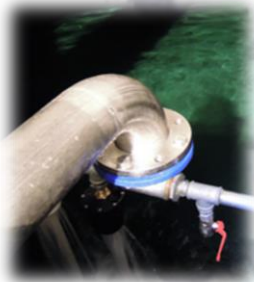
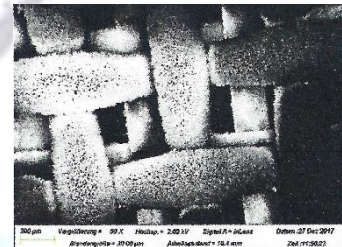


Kinetic Technology and its products, Kinetic Reactors, are result of two years research and development work, scientific confirmations and technological work on products.

We developed unique patented technology for water treatment based on phenomenon of hydrodynamic cavitation, mechanical shear stress and water aeration for oxidation purposes.

Kinetic Reactor is due to incorporated effects capable to perform:

- **Scale prevention** - when CaCO_3 is precipitating from water aragonite crystalline is formed instead of calcite (easy cleaning without chemicals, water heater performance, etc.);
- **Neutralization and degradation of unwanted and for health harmful organic and inorganic elements**, as for example iron, manganese, cadmium, arsenic, etc.;



- **Microbiological disinfection of water** – general decrease of microbiological contamination, faecal bacteria (e-coli, enterococci), coliform bacteria (*Pseudomonas aeruginosa*), clostridia with sporaie (*Perfringers sporiae*) and latest Legionella;
- **Disinfectants efficiency increase** – for example efficiency of chlorine, that is during water treatment neutralized by half;
- **General organoleptic of drinking water** (smell and taste).

All above mentioned claims are coming from laboratory and test results and are validated. Of a crucial importance is professional use where reference set ups confirmed results in practice.



Kinetic Technology can be used practically everywhere due to its extraordinary scalability – the reason for our slogan “**From Water Source to Tap**”. We can cover complete urban and rural water cycle and households; networks and professional users demands.



APPLICATIONS

Pro Use



Kinetik Technology can offer many applications and fields of use. Till today we developed and put in operation systems for:

- Water sources treatment, standing and running waters,
- Industrial drive,
- Sectorial decrease of water stress,
- Water treatment for food and drinks processing,
- Water re-use (grey water) in cruise ships, etc.

Single Point Use

The basis for Single Point use is Kinetic Reactor on Tap (KR-T), having all attributes of reactors for pro use with important exemption – we formally don't declare capability to perform compliance with microbiological parameters, except for legionella. However, all tests and verifications are available public.

Kinetic Reactor on Tap



Kinetic Reactor on Tap is our core building brick for the “**From Water Source to Tap**” chain. KR-T is the first on a global scale commercially available device for water treatment in the size of faucet aerator. It is also multi-functional self-cleaning device, using just and only water stream for operation.

To be credible, claims on performance of Kinetic Reactor shall be verified. And they are – hereinafter tests and verifications from Universities, Institutes and accredited laboratories are presented. Tests and verifications were performed with reactors taken from regular production.

2

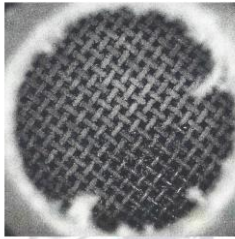
Lime Scale

Scale is consequence of CaCO_3 precipitation from water forming different crystalline structures. The most known structure is calcite (lime sticking effect). Kinetic Reactors are “producing” 100/100 of aragonite crystalline structure of scale, when CaCO_3 precipitates from water. Aragonite structure can be easily sedimented due to the physical form of powder. We performed calcination tests with Raman technique, here are results from Technical University Munich (TUM).

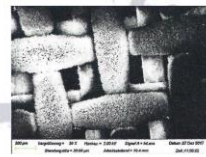
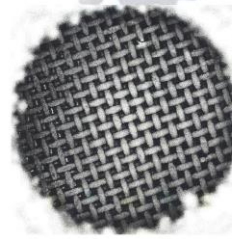
Tabelle 1: Zusammenfassung der Untersuchungsergebnisse

Probe	Morphologie	Raman	Anteil Aragonit	Anteil Calcit
3-2	Nadelige XX (Länge < 30 μm), nur im W et- was gröber, sonst pelzig, Aufwuchs im Zentrum dicker, an den Rändern dünner. zweite Lage in der Mitte belegt. Scharfe Bruch- stelle auf 4 Uhr	Aragonit und sehr geringe Anteile Calcit	100	0

Standardni vložek – 100% Kalcit



Kinetic Reactor vložek – 100% Aragonit



Inorganic Pollutants

It is commonly known in many cases water contains heavy metals, in many cases harmful for our body and to all living creatures. Tests for heavy metals were performed at Croatian public health institute – accredited lab. Results:

Standard Raw Water

Naziv parametra	Metoda	Mjerna jedinica	Rezultat	*MDK	Ocjena ispravnosti
Olovo (Pb)	HRN EN ISO 11885: 2010	µg/L	7,7	10	DA
Kadmij (Cd)	HRN EN ISO 11885: 2010	µg/L	1,1	5	DA
Cink (Zn)	HRN EN ISO 11885: 2010	µg/L	159	3.000	DA
Željezo (Fe)	HRN EN ISO 11885: 2010	µg/L	12,7	200	DA
Nikal (Ni)	HRN EN ISO 11885: 2010	µg/L	4,2	20	DA
Mangan (Mn)	HRN EN ISO 11885: 2010	µg/L	4,7	50	DA
Bakar (Cu)	HRN EN ISO 11885: 2010	mg/L	0,0542	2	DA

KR-T Treated Water

Naziv parametra	Metoda	Mjerna jedinica	Rezultat	*MDK	Ocjena ispravnosti
Olovo (Pb)	HRN EN ISO 11885: 2010	µg/L	3,8	10	DA
Kadmij (Cd)	HRN EN ISO 11885: 2010	µg/L	<1	5	DA
Cink (Zn)	HRN EN ISO 11885: 2010	µg/L	55,1	3.000	DA
Željezo (Fe)	HRN EN ISO 11885: 2010	µg/L	<6	200	DA
Nikal (Ni)	HRN EN ISO 11885: 2010	µg/L	<2	20	DA
Mangan (Mn)	HRN EN ISO 11885: 2010	µg/L	1,5	50	DA
Bakar (Cu)	HRN EN ISO 11885: 2010	mg/L	0,0122	2	DA

Results are speaking for itself. Residual chlorine on tap, when finished its role of bacteria destruction and prevention, is reduced by more than half.

Microbiology

We perform bacteria quantification in water (Bactiquant water measurements). Those measurements tell us about water stress flowing thru Kinetic Reactor to your glass, hands or pot.

Measurements of water at tap for local community not using any water treatment device are showing the following:

Water/Reactor	BQ	Chlorine	Decrease(in%)
Raw water on tap	51	-	-
KR-T Standard	44	-	14%
KR-T Saving	36	0,20 mg/l	30%
KR-T Modified	26	-	49%
KT-T Modified	24	0,20 mg/l	51%

Modified versions are intended for heavy stressed/loaded waters and for special purpose applications (hospitals, food processing, environments with special care on microbiological parameters, etc.).

Compliance with microbiological parameters is another topic we are covering on the regular basis. Results with KR-T for above mentioned water of local community.

Vzorec 18/57891; Pitna voda; RAN LAB - surova voda

Escherichia coli MPN	najdeno (<4)	MPN/100	0	ni skladen
Koliformne bakterije MPN	32	MPN/100	0	ni skladen
Enterokoki	ocenjeno 5	CFU/100 mL	0	ni skladen
Clostridium perfringens	ni najdeno	CFU/100 mL	0	skladen
Skupno število mikroorganizmov pri 37°C	<10	CFU/mL	100	skladen
Skupno število mikroorganizmov pri 22°C	<10	CFU/mL	/	/

Vzorec 18/57892; Pitna voda; KR - TS LAB

Escherichia coli MPN	najdeno (<4)	MPN/100	0	ni skladen
Koliformne bakterije MPN	41	MPN/100	0	ni skladen
Enterokoki	ni najdeno	CFU/100 mL	0	skladen
Clostridium perfringens	ni najdeno	CFU/100 mL	0	skladen
Skupno število mikroorganizmov pri 37°C	<10	CFU/mL	100	skladen
Skupno število mikroorganizmov pri 22°C	<10	CFU/mL	/	/

Vzorec 18/57893; Pitna voda; KR - TN CI LAB

Escherichia coli MPN	<1	MPN/100	0	skladen
Koliformne bakterije MPN	<1	MPN/100	0	skladen
Enterokoki	ni najdeno	CFU/100 mL	0	skladen
Clostridium perfringens	ni najdeno	CFU/100 mL	0	skladen
Skupno število mikroorganizmov pri 37°C	<10	CFU/mL	100	skladen
Skupno število mikroorganizmov pri 22°C	<10	CFU/mL	/	/

Water was chlorinated on the level of 0,20 mg/l, after treatment with KR-T 0,10mg/l of chlorine was measured.

Results confirm capability of Kinetic Reactors on Tap to ensure microbiological compliance of water on faucet with min. chlorination and capability of standard versions to ensure enterococci destruction.

LATEST RESULTS AND ACHIEVEMENTS

With the latest achievements we as creators of Kinetic Technology brought our dreams and hopes to reality. We are capable to destruct legionella and to neutralize Arsenic, two big global problems and danger.

Legionella

We performed internally and on our test bench capability to destruct legionella. It is officially – Kinetic Reactors from regular production are capable to completely destruct legionella in water. Shower heads and shower inserts are heading into the market.

Naziv ispitivanja	Metoda	MJ	Granice	Rezultat
LABORATORIJ ZA MIKROBIOLOGIJU U ODJELU ZDRAVSTVENE EKOLOGIJE				
Legionella spp.	HRN EN ISO 11731:2017	cfu/1000 ml		40
U uzorku vode izolirana je Legionella pneumophila, dokazana metodom latex aglutinacije serogrupa 1.				

Naziv ispitivanja	Metoda	MJ	Granice	Rezultat
LABORATORIJ ZA MIKROBIOLOGIJU U ODJELU ZDRAVSTVENE EKOLOGIJE				
Legionella spp.	HRN EN ISO 11731:2017	cfu/1000 ml		nije izolirana
U uzorku vode nije izolirana Legionella pneumophila.				

Arsenic

We received results of initial tests on Arsenic from Hungary where pollution with Arsenic is a problem. Standard KR-T on tap decreases amount of Arsenic by half, from 31 µg/l to 15 µg/l. Target value is below 10 µg/l.

Ver.1.4
Junij 2018