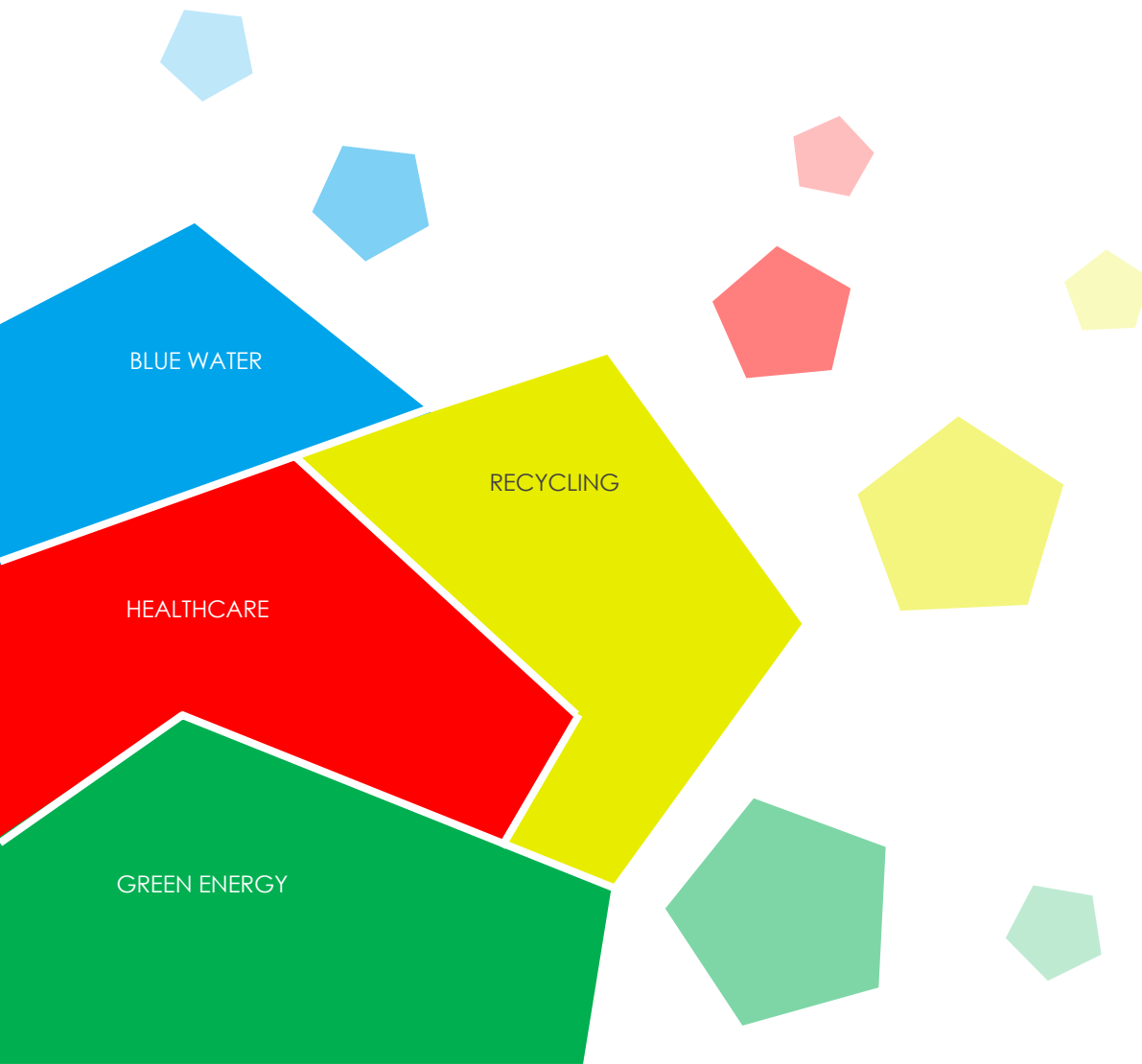





HIGHLY EFFECTIVE AND INNOVATIVE  
TECHNOLOGIES



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**Name:** "HELIOS 711D".

**Description:** Complex is capable of implementation of various types of procedures simultaneously for 9 patients with various pathologies.

**Certification:** CIS Countries, European Union and Turkey (pending).

**Latest supplies:** United States (Rehabilitation Centre, Las Vegas), Moscow (Khrunichev Rehabilitation Centre of Cosmonauts).



### DESCRIPTION OF COMPLEX:

**Therapeutic complex "HELIOS 711D"** - integrated laser center, which includes 7 function-independent therapeutic laser systems for outside, internal, contact and non-contact action by Red, IR junction lasers, including combined action with permanent magnetic field and laser-activated water. All systems operate independently and separately according to the selected mode.

**High integration will allow an optimal way to organize:**

- Multifunctional cabinet of a laser therapy.
- Specialized cabinets for servicing 9 patients simultaneous.

LNET software of the "HELIOS 711D" laser center provides control of all system resources and informational support of decision-making when planning and conducting medical procedures.

### LASER THERAPY:

**Laser therapy** is a comprehensive and coordinated action at the level of cells, tissues and organs, control, and working systems of an organism.

At the level of the whole organism, laser therapy provides a multifaceted action: regenerative, immunostimulant, anti-inflammatory, anti-edemic, desensitizing, normalizing metabolism and gas exchange, improving microcirculation.

Through influence on organs, projections of organs, receptive fields, reflexogenic zones and corporal acupuncture points by constant, modulated and pulsed red and infrared laser irradiation occurs high clinical efficiency in the treatment of a wide range of diseases.

Laser therapy complements and goes well with medicamental methods, surgery, physiotherapy, chemotherapy, homeopathy, aromatherapy, balneology and other therapies and prevention treatments.

**Therapeutic complex "HELIOS 711D"** can function as a treatment for a narrow range of diseases (e.g., urology and cosmetology) and for general use in all areas, implementing procedures simultaneously to 9 patients with various pathologies.



## THERAPEUTIC LASER SYSTEMS:

**SCANNING SYSTEM:** combined or selective multispectral scanning by red (R) and infrared (IR) lasers of a body surface. Combined irradiation of red and infrared spectrum with high scanning frequencies (100 - 150 Hz) and large positioning area (200 x 100 cm) are the main peculiarities of the scanning system.

**USED FOR** skin diseases, neurological pathologies, cardiovascular diseases, disorders of cerebral circulation, diseases of locomotorium and internal organs.

**IR-MODULATED / IR FIXED PULSE SYSTEMS:** affecting by IR-modulated and IR fixed pulse lasers with magnetic nozzles in various ways: distant, contact, contact with a compression.

**USED FOR** injuries and diseases of deep-lying organs, blood vessels, ligaments, and joints.

**INTRACAVITARY IRRADIATION SYSTEM:** affecting by R laser using photic ENT, endoscopic, vaginal, rectal, urethral, dental and other nozzles; external irradiation using acupuncture, cosmetic and other nozzles. More than 30 different optical nozzles.

**USED FOR** diseases of the mucous and abdominal organs in urology, gynecology, proctology, pulmonology, otolaryngology, dentistry, digestive organs. Alignment of energy imbalance, cosmetology.

**PERCUTANEOUS OR INTRAVENOUS BLOOD IRRADIATION SYSTEM:** affecting noninvasively by R laser in a zone of projection of arterial trunk, organs, tissue and reflexogenic zones. Intravascular laser irradiation of blood.

**USED FOR** serious diseases associated with circulatory disorders (myocardial infarction, ischemic heart disease, obliterating diseases of limb vessels, diabetic angiopathy, etc.), inflammatory diseases of internal organs (pneumonia, abdominal organs), systemic diseases (diabetes, asthma, endocrine and others).

**HYDROLASER SYSTEM:** combined influence of hydro-massage, R and / or IR-modulated lasers via the aquatic environment on the mucosal surface, tissues, reflexogenic zones and organs through special nozzles: (1) Hydro shower, (2) Dental and (3) Gynaecological.

**USED FOR** biomodification of the body state (removing depression, nervous and physical stress, pain, energy supply), treatment of functional disorders of the endocrine and autonomic nervous system, treatment of inflammations of the oral mucosa (periodontal disease, gingivitis), gynecological diseases.

## LASER MODULES - TECHNICAL DATA:

PARAMETERS OF RADIATION		RED LASER	INFRARED MODULATED	INFRARED IMPULSIVE
Wavelength (Microns)		0.63 - 0.65	0.81 - 0.89	0.80 - 0.95
Modulating frequency (Hz)		continuous	0 - 10000	1 - 500
Discretization of frequency setting (Hz)		-	0.01 in range of 0 - 100 Hz, 1.0 above 100 Hz	0.01 in range of 1 - 100 Hz, 1.0 above 100 Hz
System's mean output power (MHW)	scanner	35 - 40	80	-
	IR - modulated	-	100	-
	IR - impulsive	-	-	5 - 8 W (impulsive)
	ICI	15	-	-
	LBI, ILBI	5 - 10	-	-
hydrolaser		15 - 20	100	-



Name: "TM".

**Description:** Equipment and technology, allowing to receive a positive response of cells on treatment at the different stages of disease development.

**Certification:** Ukraine.

**Latest supplies:** Kyiv City Oncology Center.



### DESCRIPTION OF THE DEVICE:

**MAGNETOTHERAPY DEVICE "TM"** is a unique magnetotherapy device generating low intensity 3D magnetic field having different polarization, including vortex field around the whole body of a patient.

During the treatment, a patient is located inside a big size inductor, therefore magnetic field may exert action on the whole body simultaneously thus influencing all organs and systems of the organism. A session of magnetotherapy with "TM" device may have the following influence on health:

- Reduction of the amount of administered medicinal products and reduction of treatment duration.
- Improvement of wellbeing of patients with severe diseases:
- Long-term remission in patients with chronic diseases.
- Analgesic effects and improvement of psychophysical and emotional condition of a patient.
- Sleep normalization.
- Anti-inflammatory and anti-oedema action.
- Improvement of the microcirculation, peripheral circulation, and lymph drainage.
- Stimulation of hematopoiesis.
- Immune-modulating action.
- Activation of the regeneration of different tissues and vessels.
- Spasmolysis as a result of normalization of the characteristics of neurohumoral regulation (owing smooth muscle relaxation).

### ADVANTAGES OF TREATMENT WITH "TM" DEVICE:

- Device can be used for treatment of various diseases owing to its influence on all organs and systems of the organism.
- Treatment of patients with mastopathy, hysteromyoma, prostatic adenoma.
- Combination treatment of oncologic diseases.
- Reduction of the amount of administered medicinal products and reduction of treatment duration.
- Preventive treatment of different diseases owing to the action exerted on different regulatory systems of the whole body.

### SPORTS MEDICINE:

State-of-the-art treatment promotes:

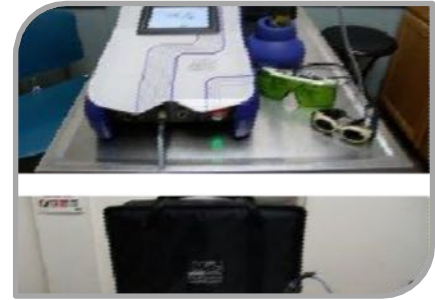
- Quick recovery after injuries (hurts, tension of ligaments) or after surgery.
- Recovery after physical exercise.
- Increased tolerance to physical exercise.



Name: "ASSISTANT".

**Description:** Prophylaxis, treatment and after treatment in fixed and mobile conditions, in private medical practice, in sporting medicine and in the medicine of debacles. Laser module Lm - 01 is applied.

**Latest supplies:** National Olympic Committee of Ukraine.



### DESCRIPTION OF THE COMPLEX:

"ASSISTANT" is the unique therapeutic complex, used in a private medical practice (family doctor), provides fast AID, used by athletes to achieve good results without the use of doping. Complex includes four (4) function-independent systems: **AWS (automated workstation)–diagnosis** - a system of noninvasive diagnostic of a functional condition of an organism; and **three (3) therapeutic laser systems**.

All systems work in parallel and separately way from each other, allowing to serve up to four (4) persons simultaneously. Built-in computer controls all functions of the complex in order to carry out the diagnostic, physiotherapeutic and preventive procedures. Also it contains techniques and patients database.

### AWS-DIAGNOSIS INCLUDES:

- Subsystem of the functional analysis of the heart rate.
- Subsystem of the electropuncture diagnostic of functional state.
- Subsystem of measuring and analysis of supersluggish activity of a brain (omegametry).
- Subsystem of the analysis of a frequency drifts of respiration (pulmotachometry).

**ADVANTAGES:** noninvasivity, simplicity of a diagnostic procedure, speed of obtaining of the results of examination, high selfdescriptiveness.

### SYSTEM OF A LASER THERAPY INCLUDES:

- Subsystem of IR modulated laser effect with magnetic nozzles.
- Subsystem of IR impulsive laser effect with magnetic nozzles.
- Subsystem of three (3) wave laser effects (combined system with red, IR-modulated, IR-impulsive lasers).

**ADVANTAGES:** Allows to execute vast complex of medical procedures with intracavitary, intravenous, cosmetology, acupuncturology, viaskin and other supplementary lenses, as well as with hydrolaser: shower, dentistry and gynaecology etc.

**Diagnostic complex "ASSISTANT" in stationary and field conditions allows to:**

- Get express information about the functional state of organs and body systems.
- Determine the need for additional in-depth medical examination.
- Determine the presence of irregularities in the cardiovascular system, circulatory system, gastrointestinal tract, urogenital system, respiratory and other systems.
- Assess the reserves and quality of health, the level of adaptation of the organism.
- Get a forecast on body's reaction to physical and nervous stress, and stress factors.
- Carry out professional selection based on medical, mental and physical performance.
- Obtain an objective and express assessment of the functional condition of the body in order to plan the training process, determine the optimal training loads and the level of readiness for competition.

### GENERAL, RESTORATION AND REHABILITATION THERAPY:

- Treatment of cardiovascular diseases, nervous breakdowns, functional violations of endocrine and vegetative nervous systems, traumas, catchcold-zymotic diseases and sexual distresses.
- Biomodification of a condition of an organism.
- Taking out of depressive condition, nervous and physical strains, pain sensations, power replenishment, treatment of different inflammations, gynecological diseases.
- Rising of immunodefence, prophylaxis of diseases, dump on the eve of starts, stimulation of an organism directly ahead of starts, relaxation and recovery after competitions.
- Prophylaxis of a professional stress - by rising adaptive capabilities of an organism to activity with effect of the extreme factors.
- Aftertreatment of fatigue and rising of functionability through optimization of internal natural physiological and biochemical mechanisms.

Name: "ANDROMEDA-3M".

**Description:** Treatment and prophylaxis of diseases in: urologies, proctology, gynecology, sexual pathology, andrology. Laser module Lm - 01 is applied.

**Latest supplies:** Republican Centre of sexual pathology (Kiev, Ukraine).



### DESCRIPTION OF COMPEX:

"ANDROMEDA-3M" complex is intended for realization of physiotherapeutic and preventive medical procedures by local transrectal, vaginal and transurethral effect on organs and locuses of pathology.

The high therapeutic efficiency is reached by integrated influencing on key physiological processes, tissues, reflexogenic zones and organs of following physical effects: massagelaser, vibrolaser, magnitolaser, thermolaser, hydrolaser.

ANDROMEDA-3M consists of a central unit and functional peripheral systems that are running under control of built-in microprocessor.

**Microprocessor control allows to:**

- Set and control all the parameters of peripheral systems.
- Choose from the standard (recommended) treatment regimens, or select individual one.
- Carry out the work in automatic mode, maintaining the given parameters of the treatment session.

### THERAPEUTIC INFLUENCE:

#### IN UROLOGY:

- Improvement of drainage function and blood supplies of prostate gland.
- Taking out of stagnant phenomenon.
- Recovery of sensitivity of trophicity of the nervous terminations (endings).
- Achievement of training effect of contraction of muscles of prostate.
- Recovery of sexual and reproductive function.
- Intensifying of libido.

#### IN GYNECOLOGY:

- Improvement of functions of ovaries.
- Improvement of reducing capacity of parent tubes, hemo- and limfodynamics of organs of a small basin, antispastic and resorptional operating.
- Recovery of sensitivity and trophicity of the nervous terminations.
- Treatment of anabrosis of journal of uterus.
- Recovery of sex and genesial function.

## PERIPHERAL SYSTEMS:

**LASER MASSAGE SYSTEM - MLS-01 / MLS-02:** allows to conduct transrectal massage of a prostate gland, and also vaginal massage in combination to laser effect.

Features: a smooth variation under the given program of amplitude and frequency of a massing within the limits of 1 - 90°C and 0.1 - 100 Hz accordingly.



**VIBROLASER SYSTEM - VLS-01 / VLS-02:** allows to conduct transrectal or vaginal vibromassage in combination to laser effect.

Features: a smooth variation of frequency of chattering within the limits of 10 - 5000 Hz under the given program.



**MAGNITOLASER SYSTEM - MGL-01 / MGL-02:** allows to conduct transrectal / vaginal combined effect on slimy rectums or vaginas by a magnetic field with a laser radiation.

Features: programmatic change of parameters of a laser radiation.



**THERMAL SYSTEM - GTS-01 / GTS-02:** allows to conduct effect, hypothermal, pyrexial and combined with a laser radiation, on slimy rectums or vaginas on a selected time chart.

Features: a smooth variation of temperature within the limits of 4 - 43°C under the given program.



Optical laser nozzles allow to conduct local transurethral, transrectal, vaginal, outside labile, acupuncture and hydrolaser effect.

**Name:** "TONUS".

**Description:** Prophylaxis, treatment and aftertreatment of diseases in: cardiology, neurology, dermatology, odontology, cosmetology, gynecology. Laser module Lm - 01 is applied.

**Certification:** Russia, Ukraine.

**Latest supplies:** USA (Rehabilitation Center, Las Vegas), Russia (Cosmonaut Khrunichev Rehabilitation Centre, Moscow).



### DESCRIPTION OF COMPLEX:

"TONUS" complex is intended for realization of physiotherapeutic and preventive medical procedures by hydrolaser effect - combined effect by the laser through a water environment on organs, locuses of pathology and all organism as a whole.

High therapeutic efficiency is reached by complex influence on key physiological processes, tissues, reflexogenic zones and organs of the following factors:

- Low intensive laser effect by 3 wave system.
- Hydromassage by water sprays of adjustable pressure and temperature.
- Effect by laser activated water.

**GENERAL THERAPEUTIC EFFECTS** (at a level of cell, organs, organism):

- An enhancement of activity antioxidant systems and protection of cells against operating free radicals.
- Stimulation of biosynthetic and biopower processes.
- Improvement of microcirculation and flow characteristics of a blood.
- Anesthetizing, vasohypotonic, unflamantary.
- Normalization of metabolic processes.
- Activation of a trophicity of tissues, normalization of a nervous excitability.
- Drop of an endogenic intoxication, recovery of functional violations of an endocrine and vegetative nervous system.

**BIOMODIFICATION OF ORGANISM STATE:**

- Improves a general condition of health.
- Has a tonic, harmonizing and sedative effect.
- Increases body resistance to different diseases.
- Renders antidepressive and antistressful effect.
- Takes out a nervous – emotional strain, irritability, sleeplessness.
- Takes out a set of symptoms of chronic overwork.
- Increases mental and physical activity.
- Reduces fatigability and increases functionability.

"TONUS" consists of a central unit and functional hydro nozzles.

**MICROPROCESSOR CONTROL ALLOWS TO:**

- Define, monitor and store the set parameters of the treatment session.
- Choose from the standard (recommended) modes of treatment and prophylaxis or select individual one.
- Carry out the work in automatic mode

**Standard programs:** prophylactic, rehabilitation, healing, cosmetic, therapeutic and others.

## SPECIALIZED NOZZLES:

**HYDROLASER SHOWER NOZZLE SN-01:** Allows conducting biostimulating hydromassage in combination to laser effect.



**GYNECOLOGICAL NOZZLE GN-01:** Allows conducting vaginal hydromassage in combination to laser effect with the help a disseminating light nozzle.



**ODONTOLOGICAL NOZZLE ON-01:** Allows conducting hydromassage in combination to laser effect.



## THERAPEUTIC INFLUENCE:

### CARDIOLOGY, NEUROLOGY:

- Improves a cerebral circulation.
- Treatment of an osteochondrosis.
- Treatment of neuritises, neuralgia, neurosises.
- Normalizes a function of nervous, immune and endocrine systems.

### UROLOGY, GYNECOLOGY:

- Treatment of distresses of a man's and female sexual orb: prostatitis, inflammation of urinary bladder etc.
- Chronic inflammations of a uterus, ovaries etc.
- Recovery of sensitivity and trophicity of the nervous terminations (endings).
- Recovery of a sexual and genesial function, intensifying a libido.

### COSMETOLOGY, ODONTOLOGY:

- Improves a blood supply of a problematic skin, promotes its neogenesis: slows down an aging of cells and exocellular connecting tissue.
- Increases resiliency of a skin and normalizes water-in-oil balance: improves an elastance and reduces density of a false skin and derma.
- Increases efficiency of effect of nutrient materials of creams.
- Takes out an inflammation of a slimy oral cavity (paradantoses, ulites).

### SPORTS MEDICINE:

- Stimulation before competitions.
- Relaxation after loads.
- Taking out of a fatigue and depressive condition after physical, psychological overloads.
- Promotes a muscle release phenomenon and recovery of forces.
- Takes out pain sets of symptoms at traumas, bruise.





**Name:** "SCREENER-5M".

**Description:** Express assessment of organism radionuclide pollution.

**Certification:** Russia.

**Latest supplies:** Japan (Tokyo, Fukushima). Total number delivered - more than 250 pieces.

**Awards:** Gold Medal of International Forum in Brussels.



### DESCRIPTION OF COMPLEX:

"SCREENER-5M" is a unique medical complex of express assessment of radionuclide contamination of the organism, based on AWS-Nuclide. System runs under built-in computer.

**ADVANTAGES:** non-invasive, simple diagnostic procedure, speed of test results, high descriptiveness.

### AWS-NUCLIDE SYSTEM:

**AWS-Nuclide** is a system of operational definition of radioactive sources in the body and provides:

- Identification of very low activity of radionuclides of different origin in the human body (route of nuclides - air, water and food).
- Monitoring the effectiveness of removal of nuclides.
- Development of measures to reduce radiation exposure.

**AWS-Nuclide** is designed to measure incorporated radionuclides in the human body and allows quickly to:

- Determine qualitative and quantitative composition of the radionuclides and their activity in the lungs, the gastrointestinal tract throughout the human body.
- Conduct express monitoring of the entire body to the presence of a very low activity radionuclides.
- Assess the individual radiation dose burden on the person.
- Identify the critical group (risk) with a high content of radionuclides.
- Choose the most effective sorption medications or other removal methods of nuclides from the body.

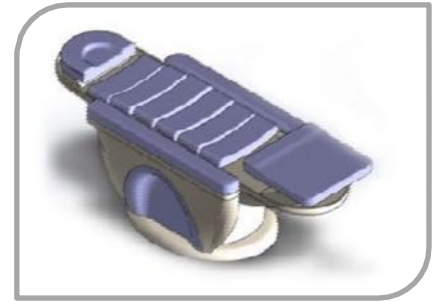
Types of radionuclides registered: I, Am, Cs, Co, Ru, K etc.

The minimum detectable activity: 5 - 10 nKu.



**Name:** "BIOTRONIC".

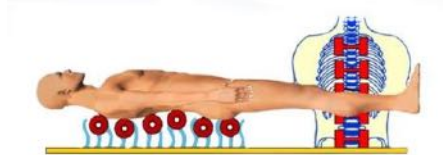
**Description:** Prevention, treatment and rehabilitation in the field of physical therapy, pediatrics, balneology, sports medicine.



### DESCRIPTION OF COMPLEX:

"BIOTRONIC" is a unique medical complex that is used for prophylaxis, treatment and rehabilitation in physiotherapy, pediatrics, balneology, sports medicine. "BIOTRONIC" is: (1) A new solution in hardware wave vibrotherapy; (2) An indispensable assistant to the family doctor; (3) Modern approach to non-pharmacological treatment.

High therapeutic efficiency is achieved through comprehensive influence over key physiological processes, tissue, reflex zones and human organs by following factors: (a) Low - High-frequency pulse and vibration impact; (b) Radiant infrared impact; (c) Sound relaxation.



### GENERAL, RESTORATION, AND REHABILITATION THERAPY:

- Treatment of cardiovascular diseases, nervous disorders, functional disorders of the endocrine and autonomic nervous systems, trauma, catarrhal, infectious diseases and sexual disorders.
- Biomodification of state of the body - the removal of depression, nervous and physical stress, pain, energy supply, treatment of various inflammations, gynecological diseases.
- Enhance immunity, disease prevention, stress relief before the start, toning the body just before the start, relaxation and recovery after the competition.
- Prevention of professional stress by increasing the adaptive capacities of the organism to work with the influence of extreme factors.
- Rehabilitation of fatigue and increase efficiency through the optimization of internal natural physiological and biochemical mechanisms.

Rehabilitation and therapeutic effect is achieved with a native mechanical vibration wave of "smart" paravertebral massagers, which makes kneaded portion of the back along the spine to oscillate along a complex trajectory, and magnified while performing the procedure in combination with heat and other influences.

Lying back on the couch, the patient puts his feet on the recess of the simulator, which swings pelvic bones and transmits the undulatory motion to the spine and up to the cervical spine.

As a result of complex procedures the spine is massaged in two planes: longitudinal and transverse under the influence of which the spine is straightened and stretched, disappears infringement of nerve endings, relieves muscle spasms, restores normal mobility of the vertebrae, improves conduction of nerve impulses to the internal organs and tissues.

#### PROCEDURES PERFORMED:

- Local micro-stretching.
- Dosed roller massage.
- Adjustable heating of paravertebral area.
- Dosed vibration massage of the spine.

#### DISEASE TREATMENT AND PREVENTION:

- Osteochondrosis.
- Scoliosis.
- Curvature of the spine.
- Hernia and protrusion of the intervertebral discs.
- Other diseases of the spine.

#### THERAPEUTIC EFFECTS ACHIEVED DURING THE PROCEDURE:

- Dilation of blood and lymph vessels.
- Increase in blood circulation.
- Stimulation of metabolism.
- Increased breakdown of lactic acid in the muscles that prevents a state of exhaustion.
- Relieving muscle stress.
- Muscle tissue becomes more elastic.
- Deepening breathing.
- Decrease in heart rate and blood pressure.
- A calming effect on the nervous system.

**Name:** "ONCO SCREENING".

**Description:** Method taken as a principle of technology is based on detection in surveyed whey fibers or polypeptides with changed chemical, and / or physical properties which are synthesized by tumoral cages from the beginning of their origination.

**Market potential:** We have good feedbacks on technology and development proposition from Boston Medical Group.

**Latest supplies:** 3 hardware complexes for three different clinics.



### DESCRIPTION OF TECHNOLOGY:

Within last 10 years group of the Ukrainian scientists develops the technology of early preliminary treatment of the oncological diseases which last version has gained name "ONCO SCREENING".

"ONCO SCREENING" is a new approach to screening of the malignant new growths, engaging use at the first stage of a diagnostic study of the universal method screening preliminary treatment.

Technology develops of 3 basic components: (a) laboratory, (b) hardware and software room and (c) organizational. As a substance for probe serves a whey of person blood.

**LABORATORY** unit engages special machining of surveyed whey by chemical and physical affecting (light).

**HARDWARE AND SOFTWARE** unit engages the specialized spectrophotometer and the software. It is intended for obtaining of response effect, machining and storage of information, database forming.

**ORGANIZATIONAL** unit is an integral part of technology and engages rational takeoff of contingents for survey realization, patients allocation to additional methods of preliminary treatment depending on testing effects, dynamic observation for surveyed throughout the long-term period. Medial time from a blood taking before obtaining of response effect makes 2.5 hours.



### CLINICAL TRIAL OF THE METHOD:

On the given procedure at present time it is surveyed more than 2000 persons. Diagnostic sensitivity and specificity of a method have made 85 - 90 %.

Diagnostic efficiency of the test is studied in survey of 734 women from which at 318 occurred malignant new growths of mammary glands, uterus and ovaries. Diagnostic sensitivity of a method has made 97.5 % and specificity of 84.1 %.

High self-descriptiveness, simplicity of fulfillment, sweeping obtaining of effect, allow to recommend wide application of a method "ONCO SCREENING" in the capacity of the first stage of the most widespread oncological diseases at women screening. Health Ministry of Ukraine approves methodical recommendations about method use in medical institutions of Ukraine.



### ADVANTAGES:

- **Efficiency of "ONCO SCREENING"** is not lower than the results known markers of malignant growth.
- **Method can be used to monitor oncological patients after treatment.**
- **Ability to monitor patients with any malignancy localization, including those without markers.**

## THEORETICAL SUBSTANTIATION OF A LABORATORY METHOD:

The method taken as a principle of technology is based on the detection in surveyed whey fibers or polypeptides with changed chemical, and-or physical properties which are synthesized by tumoral cages from the beginning of their origination.

Interacting with these fibers of special reagents and affecting on light response of certain power and spectrum leads to change of optical density of investigated whey in comparison with the control which is the whey of the same surveyed, but without reagents.



“Response reading” is carried out at the expense of whey scanning over the range a visible spectrum (360 - 600 nanometers). Thus, the effect of scanning of the control uses as a zero line. Spectrograms of oncological patients have the characteristic peaks of optical density corresponding to the anomalous fibers, reacted with reagents.

These pathological fibers can be different in different patients and at different swellings (this theme is the future design subject), however they, reacting with certain reagents come to light at scanning over the range a visible spectrum.

At healthy people these fibers miss, that allows to use the given method for early preliminary treatment of patients with oncological diseases, irrespective of origination place and a swelling morphological structure.

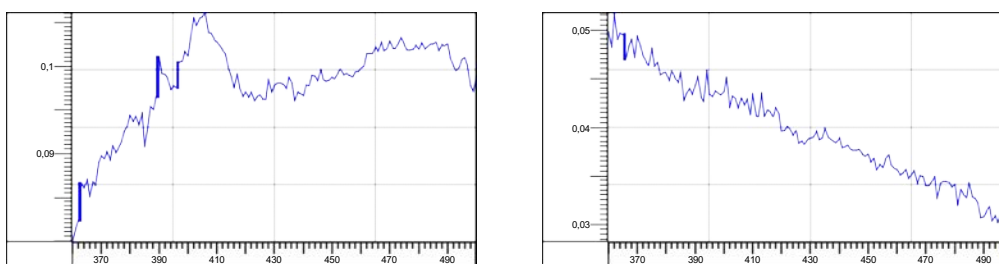


Figure 1. Curves of optical density of cancer sick uterus body (at the left) and the healthy woman (on the right)

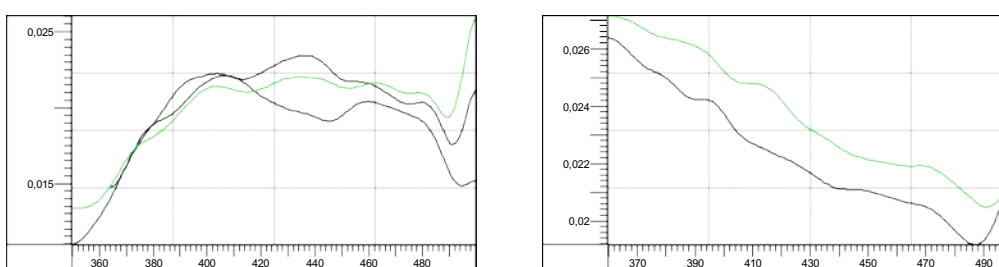


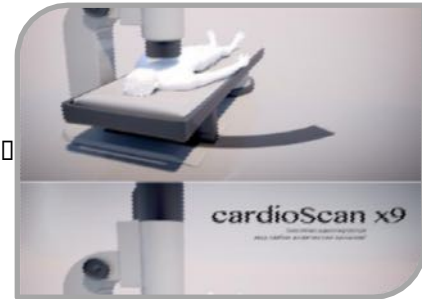
Figure 2 - 3. Characteristic spectrograms of blood whey optical density processed by test system “ONCO SCREENING”, the oncological sick (at the left) and healthy person (on the right)

## ANALOGUES:

In Ukraine, similar methods are not present. Foreign analogues are - AMAS and DR-70 which are based on another principle (the immuno-fermental analysis), and which are much more expensive considering the price of reagents and equipment, though do not yield an “ONCO SCREENING” according to their authors in accuracy of preliminary treatment.

**Name:** "CARDIOSCAN X9".

**Description:** Technology of noninvasive diagnosis of diseases, research of their development mechanisms, prediction of disease complications.



### DESCRIPTION OF COMPLEX:

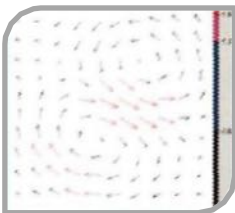
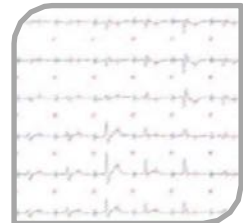
"CARDIOSCAN X9" fills a gap in the diagnosis of heart between non-invasive, but low sensitivity usual methods of diagnosis (such as electrocardiography - ECG), and invasive (e.g. coronary angiography).

Patients suspected of having coronary artery disease, but with normal electrocardiogram, can be accurately classified through "CARDIOSCAN X9", taking into account the degree of myocardial ischemia.

### OPERATING PRINCIPLE:

"CARDIOSCAN X9" operating principle is based on registration of changes in the magnetic field caused by the electrical activity of the heart during cardiocycle.

Maximum sensitivity sensors - Superconductive Quantum Interference Device (SQUID), cooled in cryostat by liquid helium to the temperature of  $-269^{\circ}\text{C}$ , are capable of detecting changes in a very weak magnetic signal.



Application of sophisticated active and passive protection of the detector allows to install equipment even in susceptible to communications disruption rooms.

Automatic sliding table for the patient, bundled with fixed detectors, allow to playback electromagnetic maps of electrical activity of the heart the size of 20 x 20 cm.

Developed method "CARDIOSCAN X9", using SQUID-technology, is highly promising for application in daily clinical practice.

### CLINICAL APPLICATIONS:

Due to its non-invasiveness, accuracy and informativeness, "CARDIOSCAN X9" method extends the region pathologies in which it can be applied with high efficiency.

#### Some of the main indications:

(1) Unclear chest pain; (2) Coronary vascular disease in patients with normal ECG; (3) Acute myocardial infarction; (4) Monitoring of patients after medical treatment; (5) Monitoring of patients after surgical treatment; (6) Monitoring of patients with heart diseases; (7) Monitoring of burn patients during treatment.



To detect early signs of myocardial ischemia, patients with unclear chest pain can be examined by medical complex. "CARDIOSCAN X9" can not only confirm the diagnosis, but also to determine the extent and scope of ischemic changes.

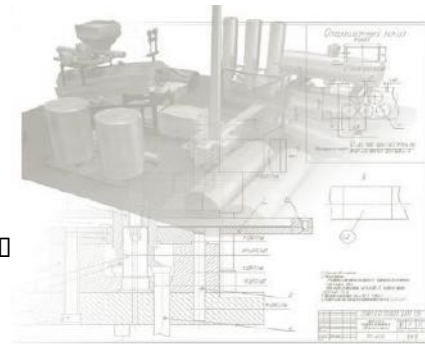
"CARDIOSCAN X9" is ultra-sensitive tool for monitoring the results of medical treatment. Through the use of "CARDIOSCAN X9" medication and treatment method can be individually matched and confirmed, without any risk to patients.

"CARDIOSCAN X9" is a class "A" unit. Also "CARDIOSCAN X9" is able to detect early signs of heart disease and to assess the risk of future development of heart disease.



**Name:** "ZKG-1000".

**Description:** Biodiesel production plant with approximate output of 500 – 1000 KG per hour. Big demand for processing of sunflower, rapeseed, palm, soybean, and others oil wastes evidence of demand for such production technology. Income can be received from the sale of biodiesel and polymers (through extension of the production plant).



### DESCRIPTION OF THE PLANT:

Biodiesel (fatty acid methyl esters or FAME) - biofuel that can be used as an alternative to conventional diesel fuel. Biodiesel can be used either alone or in a mixture with a conventional diesel fuel. Produced in Europe biodiesel shall comply with EN 14214 standard. Biodiesel has many advantages compared to a conventional diesel fuel: cleaner emissions (CO, NOx), better combustion, purifying impact on engine, etc.

Biodiesel is typically produced by alcoholysis (particularly methanolysis) from vegetable or animal fats in the presence of a catalyst. Most processes are based on alkali catalysis with use of potassium hydroxide to carry out so-called transesterification of fats.

Reaction time is usually several hours. In order to accelerate the reaction are used increase in temperature (heating) and pressure. More sophisticated approaches use special intensifiers of the process to accelerate the reaction. Principle of operation of such intensifiers based on various physical methods, such as cavitation, turbulence, ultrasound and other. Intensifier of the process is the core of the plant.

### RAW MATERIALS, CHEMICAL PROCESSING, AND PRODUCTION:

As raw materials can be used various kinds of vegetable oil wastes (sunflower, rapeseed, palm, soybean, and others). Feedstock is premixed with the methanol and catalyst and then fed to the reactor. Transesterification of fats contained in the raw materials produces biodiesel and glycerol.

Raw material is premixed with a catalyst and methanol (emulsion) and pumped through the reactor. Emulsion is then supplied to a container for separation of biodiesel and glycerol. After the separation of glycerol, biodiesel must be filtrated and purified through distillation of residual methanol (can be reused). Purified biodiesel complies with EN 14214.

Glycerol can be used as a standalone product after purification. Liquid wastes in the form of fats can be recycled, and solid wastes (soaps, salts and potassium hydroxide) must be disposed of or converted into fertilizers. Biodiesel output can be increased by using the cascade (multi-step) process.

Fig. 1 shows a block diagram of an input and output products in single-stage transesterification reaction. Percentage and masses calculation has been made in the case of palm oil as a raw material.

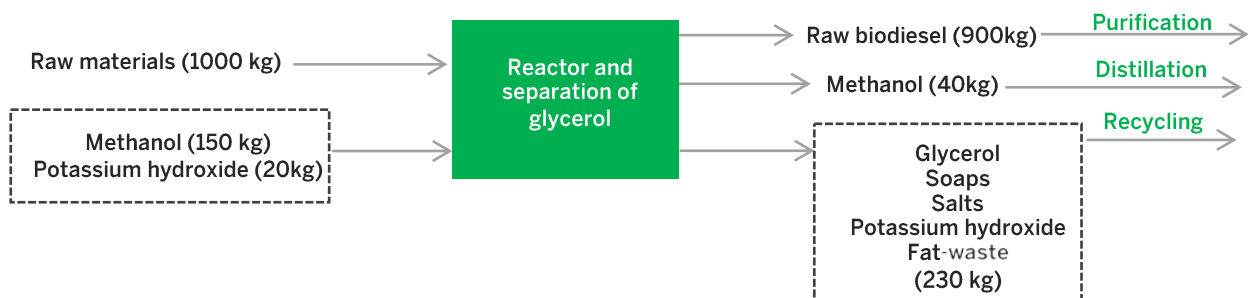


Figure 1. Block diagram of the one-step transesterification reaction

## PRODUCTION AND EQUIPMENT:

In Figure 2 depicted the flowchart of the Biodiesel production plant. Raw materials (vegetable oil) are mixed with methanol and the catalyst (potassium hydroxide) in a flow mixer with a proper proportion set by means of Automatic measurer.

Further, the emulsion is fed into cascade cavitation reactor. Designed flow rate through the reactor ranges from 500 to 1000 liters per hour depending on the type of feedstock, operating temperature, and the customer's wishes.

Then the emulsion enters the separation system (settling cone) for separating glycerol (usually runs for three hours at room temperature of 20°C). The number of settlers may be increased to ensure continuous production. Switching between the settlers carried out by means the pneumatic valves. Glycerol is drained via separate valve after separation.

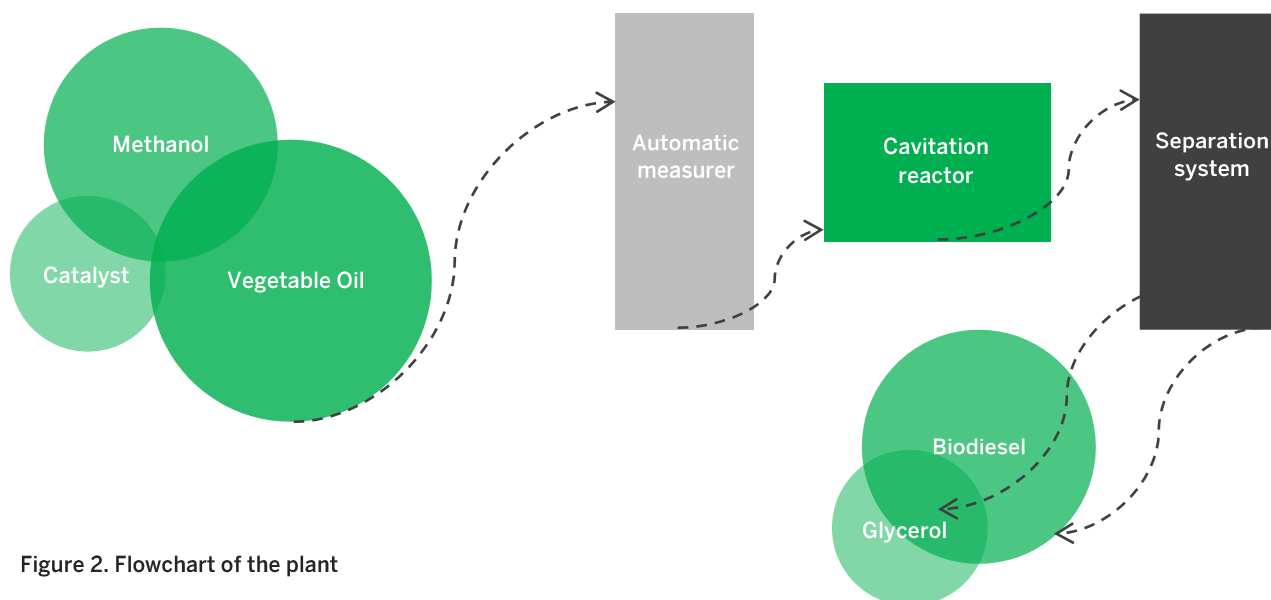


Figure 2. Flowchart of the plant

## CAVITATION REACTOR - TECHNICAL DATA:

Voltage:	AC 380 V or 415 V, three-phase
Frequency of in the network:	50 Hz
Power consumption:	3.5 kW
Size:	2 × 2 × 1.5 m
Flow rate:	From 500 to 1000 liters per hour
Operating time:	Continuous (with daily maintenance)

Name: "SUPERCAPACITORS OF NEW GENERATION".

Description: Development of hybrid battery type supercapacitor and creation of real industrial equipment for evaporation of the collector + electrode + separator.

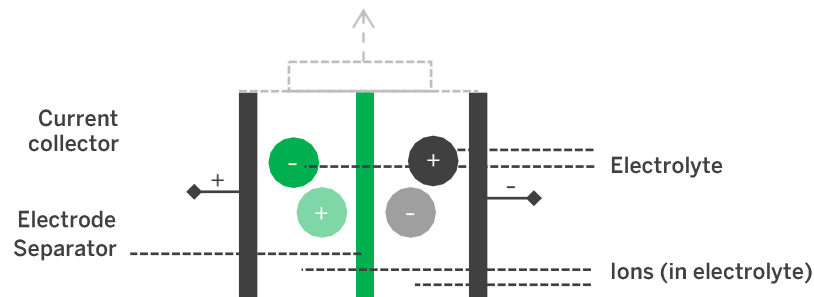


### DESCRIPTION:

**SUPERCAPACITOR (SC)** is a capacitor without the usual insulation between the capacitor plates: instead of the conventional insulating dielectric is used double electric layer (DEL), in which charge accumulates at the interface of two media - electrode and the electrolyte.

There are several basic designs of supercapacitors, but most of the electrodes are made of porous carbon. Between the electrodes located separator - dielectric, separating two electrodes and permeable to electrolyte ions. When voltage is applied to electrodes – DEL will be formed.

Functionally it is a hybrid of capacitor and chemical cell - the electrochemical capacitor.



### DIFFERENCE BETWEEN CAPACITOR AND SUPERCAPACITOR:

- Use of DEL instead of the conventional dielectric allows to increase the electrode surface area of 10 000 000 times.
- This is the main advantage of supercapacitors: their volume efficiency of 10 F / cm<sup>3</sup> and more, that is a million times higher than conventional capacitors.
- Extremely small thickness of DEL - 0.3 nm (i.e. the distance between the "plates" of supercapacitor) also allows to accumulate more energy.
- Supercapacitors slightly susceptible to self-discharge.

### ADVANTAGES OF SUPERCAPACITORS:

- **Highest specific capacity out of all kinds accumulators (both volumetric and weight).**
- **Durability** - more than 10 years and 100,000 charge / discharge cycles.
- **Very fast processes of battery charging** - up to 100% of capacity from 15 to 40 minutes (depending mainly on the capabilities of the charger).
- **Possibility of obtaining a large inrush current.**
- **No need to maintain** - SC is sealed.
- **Relatively low rate of self-discharge** - up to 10% per month.
- **Environmentally friendly (SC is based on coal).**



## APPLICATION OF SUPERCAPACITORS:

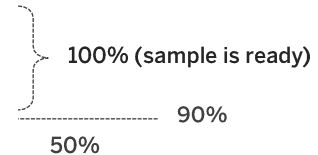
- Main / backup power chips of different household appliances (to store the memory of the batteries changing time).
- Pulsed devices that require short-term peak capacity - such as welding, electromagnetic accelerator.
- Energy storage (for example: for solar panels), uninterruptible power supplies.
- In vehicles: hybrid cars (BMW Active Hybrid X6, Audi A8 Hybrid, etc.), bus (100% hybrid or electric).
- Etc.

## THE CONCEPT:

**MAIN GOAL** is to develop the battery type supercapacitor. Goal includes:

### 1. TO CREATE A HYBRID SUPERCAPACITOR-BATTERY:

- With multiprecision density of accumulated energy (3 times or greater than lithium ion and up to 200 times greater than conventional supercapacitors, from 700 W per hour or higher
- Without corrosion of the collector (> good adhesion > increases durability).
- With low contact resistance of the electrode (> power grows).
- With the high-temperature separator.



### 2. TO CREATE EXPERIMENTAL INDUSTRIAL EQUIPMENT for evaporating of the collector + electrode + separator (3 in 1).

### 3. TO SCALE TECHNOLOGY > through creation of 100% real industrial equipment, without the shortcomings identified in the second step.

## 3 IN 1:

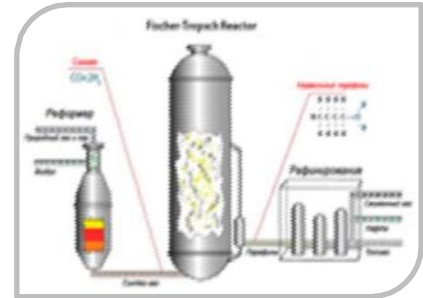
### QUALITY OF THE SUPERCAPACITOR IS DETERMINED BY:

- Bond strength of the electrode with the collector.
- Junction resistance of foil-carbon layer and size of the electrode capacity ( $F / CM^2 \cdot NM$ ).
- Thermal stability of the separator.

Our technology greatly improves all of these three basic components of modern supercapacitors: collector, electrode, and separator.

In fact, we have made the breakthrough, allowing quickly charge and discharge the supercapacitor, but at the same time:

- Reliability and durability of products have increased significantly (through the improvement of the collector).
- Much more energy is accumulated, what allows to reduce the weight and size of the supercapacitor (through the improvement of an active electrode).
- Supercapacitor became more heat resistant and safe (through the improvement of the separator).
- Moreover, all three elements are used not only in the production of supercapacitors but may be sold separately, very quickly taking a leading position in the market in regard of price and quality.
- Strictly speaking, we offer not one but three technologies by means of which it is already possible to assemble the fourth - storage condenser.
- All three technologies are manufactured with the use of costs efficient magnetron coating technology.



**Name:** "SYNTHETIC FUEL".

**Description:** Technology of obtaining liquid fuel.

### DESCRIPTION OF TECHNOLOGY:

Synthesis technology (dimethyl ether) consists of two stages - a methanol synthesis and dehydration. The use of hybrid catalysts allows to combine these two steps in a single reactor. Unlike the synthesis of methanol, thermodynamics of a direct synthesis is more favorable. Due to the simultaneous occurrence of all three reactions, the conversion reaches 90%.

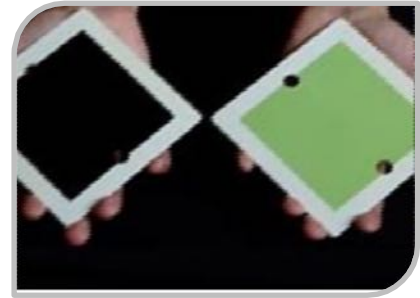
$\text{CO}_2 + 3\text{H}_2 = \text{CH}_3\text{OH} + \text{H}_2\text{O}$	$-\Delta H_{298} = 50,1 \text{ kJ / mol}$
$2\text{CH}_3\text{OH} = \text{CH}_3\text{OCH}_3 + \text{H}_2\text{O}$	$\Delta H_{298} = 40,9 \text{ kJ / mol}$
$\text{CO} + \text{H}_2\text{O} = \text{CO}_2 + \text{H}_2$	$-\Delta H_{298} = 23,4 \text{ kJ / mol}$

### COMPLEX MATRIX:

CHARACTERISTICS	GASIFICATION	COMBUSTION
Emission of dioxins	0.02 ngeq / m <sup>3</sup>	0.5 - 1.1 ngeq / m <sup>3</sup>
Space requirements	small	big
Obtaining of electricity	35%	15 - 20% gas turbine
Capital costs	Approx. 500\$ / kWe	2000 - 2500\$ / kWe

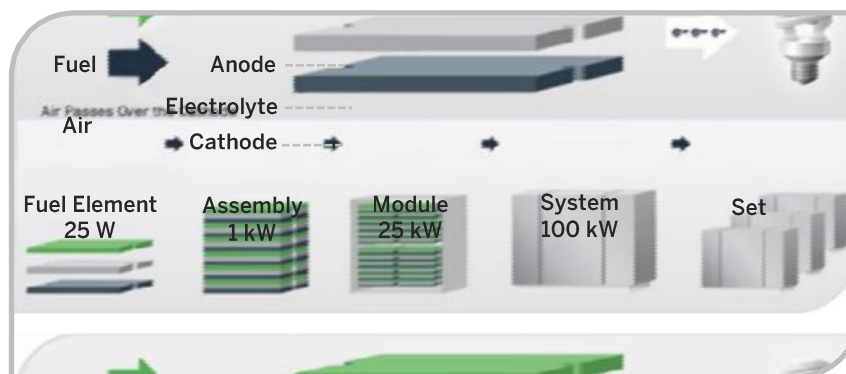
Name: "FUEL CELLS".

Description: Technology allows the conversion of syngas into electricity.



### DESCRIPTION OF TECHNOLOGY:

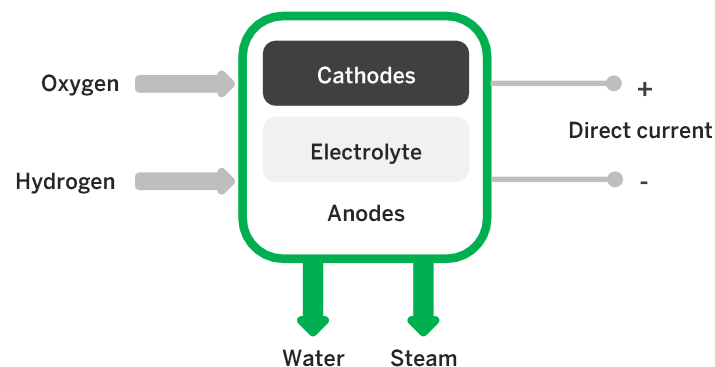
Fuel cell is a device that directly converts the chemical energy of fuels into electricity and heat.



Operating principle on example of a Solid Oxide Fuel Cells (SOFC), main components of which are - anode, cathode, and electrolyte:

- 1) Fuel is supplied to the anode in the form of combustible gas (hydrogen, hydrocarbon compounds), where the catalyst facilitates its dissociation into cations.
- 2) Oxidant gas (oxygen, air) is supplied to the cathode.
- 3) At the cathode oxygen reduction reaction takes place while it is ionized. Oxygen ions are passed through the ceramic electrolyte to react with the fuel. Reaction occurs at the anode.
- 4) At the anode, the oxidation of fuel takes place, with the participation of fuel cations and anions of oxygen. Reaction liberates electrons and thermal energy. Also, the reaction products are water steam (in case of using pure hydrogen) or water steam and carbon dioxide (in case of using hydrocarbon fuel).

### FUEL CELL OPERATING SCHEME:



Fuel cell can generate electricity continuously as long as fuel and air (oxygen) are supplied. In order to obtain a sufficient voltage for use, fuel cells shall be connected together in so-called stacks.

Direct current which generates a cell can be used both directly and converted into an alternating current with a given frequency through an inverter.

Produced heat can be partially used in the system (preparation of fuel) or fully discharged, for example, for heating or water heating.

Fuel cells are the main unit of the system (generator), which also includes the fuel preparation unit, air (oxygen) supply unit, cooling unit and control unit.

Alternating power supply to the consumer occurs via an inverter. Capacity of fuel cells generator during operation is easily adjustable with the rate of 1 MW per second.

Fuel cells are the most effective alternative to traditional energy, can reduce the consumption of conventional fuels and to use alternative fuels.



### ADVANTAGES OF FUEL CELLS GENERATORS:

Principle of operation of fuel cells (direct conversion of chemical energy into electrical and thermal) implies a number of advantages of thermal and electric energy fuel cells generators in comparison to the common types of heat generators:

- **High electrical efficiency even at low power and at partial loads.**
- **Overall efficiency reaches 90%.**
- **Absence of moving parts, and as a result - high reliability, low rates of physical deterioration and almost complete absence of noise (noise level is not higher than that of domestic air-conditioner running), low maintenance costs.**
- **Up to 50% fewer CO<sub>2</sub> emissions compared to the existing thermal power plants and cars, no harmful emissions of NO<sub>x</sub>, SO<sub>2</sub>, CO.**
- **Selection of installed capacity due to the modular structure of the fuel cells generator, power line - from 1 W to 100 MW.**
- **Capacity of fuel cells generator during operation is easily adjustable with the rate of 1 MW / second.**

### CLASSIFICATION OF FUEL CELLS:

Electrochemical process occurring in the fuel cell can be carried out through the use of various materials in various forms and occurs at various temperatures. As a fuel can be used hydrogen, as well as products of liquid and solid hydrocarbons processing.

To prepare hydrocarbon fuels for fuel cells, the system (generator) shall be equipped with reformer and purification system from harmful contaminants (e.g., sulfur).

If gas mixtures are used as a fuel - hydrogen and combustible hydrocarbon compounds (mixture of reforming products) - except for electricity, heat and water, the carbon dioxide releases additionally.

Fuel cells are classified by kind of the electrolyte and the operating temperature. Electrolyte can be liquid (solutions of salts acid) or solid (polymer, ceramic).

Material of electrolyte determines the construction and operating temperature of the cell, as well as the choice of materials of anode and cathode. Operating temperature is a key factor in determining the scope of use of fuel cells.

### TYPES OF FUEL CELLS:

- Solid oxide fuel cell (SOFC).
- Phosphoric acid fuel cell (PAFC).
- Polymer electrolyte fuel cell (PEM or PEFC).
- Molten-carbonate fuel cell (MCFC).
- Alkaline fuel cell (AFC).
- Methanol fuel cell (DMFC).
- Zinc Air Fuel Cell (ZAFC).
- Proton ceramic fuel cell (PCFC).
- Solid acid fuel cell (SAFC).
- Microbic fuel cell (MFC).

### SOLID OXIDE FUEL CELLS (SOFC):

Among the world's known types of fuel cells, the most suitable to meet the needs of a wide range of consumers of electricity at the present state of development of these technologies are zirconium-ceramic fuel cells (SOFC) and proton-exchange membrane (PEM).

Solid oxide fuel cells are most attractive for domestic, transport, industrial use, where relatively large capacity and high performance required while proton-exchange membrane generators are more suitable for use in portable devices of small capacity (and their production requires platinum).

Table shows that the solid oxide fuel cells have higher efficiency compared with conventional electrical and heat generators (at comparable capacity, the data given for the 10 MW).

TYPE OF FUEL	PRINCIPLE OF GENERATION	POWER GENERATION RATIO PER 1 TON OF FUEL EQUIVALENT	HEAT GENERATION RATIO PER 1 TON OF FUEL EQUIVALENT IN THE ELECTRICITY GENERATION MODE
Natural gas, coal, fuel oil	Steam turbine	0.3	0.5
Natural gas, synthesis gas	Gas turbine	0.35	0.5
Natural gas, synthesis gas, hydrogen, acetylene, biogas	Fuel cell (SOFC)	0.6	0.2

### OUR COMPETITIVE ADVANTAGES:

- High quality of stabilized zirconium dioxide powders for the manufacture of anode and high conductivity electrolyte.
- Operating temperature of the cell is 600°C.
- Electron beam method (EB-PVD) of electrolyte sputtering allows to obtain an electrolyte film with higher conductivity compared to conventional technologies.
- Highly conductive thin (~ 3 mm) electrolyte (1Ce10ScSZ) from domestic production powder with internal resistance of 0.6 ohm x cm<sup>2</sup> (world analogues - 2.0 ohm x cm<sup>2</sup>). Internal resistance of electrolyte of fuel cell is indicative of the rate of oxygen ion transfer between the electrodes (from anode to cathode), which determines the speed of electrochemical reaction of fuel oxidation on anode - one of the main indicators of efficiency of the fuel cell.
- LSCF film cathode for low temperatures with the optimal coefficient of thermal expansion, manufactured through electron-beam deposition (EB-PVD).
- For the necessary structuring of anode materials was developed technology for improving the mechanical and electrical characteristics of the anode redox cycle.
- Powders produced from Ukrainian raw materials under our technology, provide the highest conductivity at the operating temperatures of the cell (the data obtained in the laboratory of the University of St. Andrew, United Kingdom). This directly demonstrates the possibility of creating ceramic fuel cell with a higher efficiency which will operate at a temperature of 600°C or even 500°C. This means the possibility to use for the production fewer costly materials.
- Powder produced under our technology due to the stepwise densification during sintering (powder particles morphology feature), allows to obtain highly porous (about 20%) structures even at sintering temperatures of 1500°C. which indirectly indicates its temperature structural stability. Such indicators do not have the ceramic created on the basis of commercial analogs of Ukrainian powder, manufactured by DKKK (Japan) and Praxair (USA). Ukrainian powder with its properties is best suited for creating electrode structures of fuel cells.

Thus, the chemical composition of developed by us powder manufacturing technology provides a clear competitive advantage.

**Name:** "EMULSIFIED FUEL".

**Description:** Technology and equipment that allows to reduce the cost of fuel for consumers using liquid fuels: diesel, biodiesel, kerosene, fuel oil, heating oil, etc. by adding water to the fuel.



### DESCRIPTION:

Today, the characteristics of most of the fuels used do not meet the increased requirements on the content of harmful contaminants in the exhaust gasses. At the same time, the growth of environmental requirements for fuels leads to an increase in costs of oil processing and, as a result, to an increase in the price of the final commercial product. All these circumstances create the urgent need for the development and early implementation of industrial technologies for production of alternative, cheaper fuels.

**APPLICATION OF EMULSIFIED FUEL (EF)** in the thermal power plants, water boilers, and industrial enterprises has some significant advantages in the field of economy and ecology. Technology and equipment allow to obtain EF from the following fuels: diesel, biodiesel, fuel oil, kerosene, heating oil, contaminated waste oils.

Application of EF on all existing power plants with all kinds of liquid fuels **will improve the economic, environmental and energy characteristics** without technological change in the enterprise.

### TECHNOLOGICAL PROCESS:

**Developed by us during more than 15 years unique technology, implemented in the laboratory experimental sample, allows burning with a high calorific value emulsified fuel (fuel + water), in percentage: 60% of fuel + 40% water. Wherein soaked up the same amount of heat as on burning 100% of fuel.**

Developed technology is a highly efficient economical solution that improves and extends the life cycle of the equipment that consumes fuel and bio-fuel, liquid fuels at power plants, boiler houses, and transport.

Thus, technology will allow to reduce the cost of fuel for consumers using liquid fuels: diesel, biodiesel, kerosene, fuel oil, heating oil, etc. by adding water to the fuel.





Name: "UNITEX".

**Description:** New technology of wastes processing (oil sludges and hazardous wastes) through thermal oxidative vortex steam gasification. Designed as a compact mobile complex.



### COMPOSITION AND BRIEF DESCRIPTION:

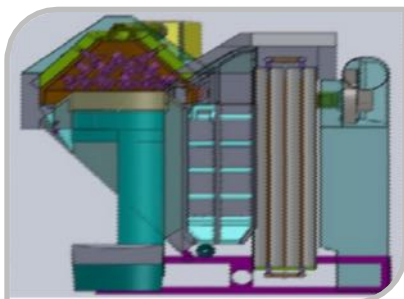
- "UNITEX" complex is a technological equipment designed for thermo-oxidative vortex conversion of oil slurries and production from it of syngas (artificial synthetic fuel).
- Main functions of the "UNITEX" complex are the processing of oil slurries - organic raw materials (oil-processing waste) and their gasification in environmentally friendly manner.
- "UNITEX" complex has an adaptive productivity and can recycle from 500 to 3000 KG of raw material per hour.
- Due to thermo-oxidative vortex conversion of 1 kg of oil slurries is generated from 2 to 4 NM<sup>3</sup> of syngas (depending the characteristics of the raw materials). Syngas as part of the "UNITEX" local energy complex is used for the production of the thermal (electrical) energy.

### MAIN DISTINCTIVE AND INNOVATIVE CHARACTERISTICS OF THE "UNITEX" COMPLEX:

- Feed processing with a high humidity (up to 70%) in contrast to analogues which process organic with a maximum humidity up to 25%.
- Applied genuine technology of ionized steam-air gasification.
- Applied genuine technology of resonance acousto-vortex gasification, which allows obtaining a syngas with a high calorific value.
- Applied genuine system of flue gasses purification.
- Deep thermal decomposition of carbon materials.



### OPERATION AND EQUIPMENT OF THE "UNITEX" COMPLEX:



"UNITEX" complex is designed for use in all macroclimatic regions. Materials used in the production of "UNITEX" complex are classified as low-hazardous or moderately-hazardous (according to GOST 12.1.044).

"UNITEX" complex a finished product and contains all the components and machinery required to perform its primary function—thermo-oxidative vortex conversion of oil slurries and production from it of syngas (artificial synthetic fuel).

Basis of the "UNITEX" complex is a vortex gas generator VRG-01 of high-speed high-temperature conversion of raw materials of oil slurries with active steam and the air oxidant and reversed extraction of the aerated gas.

Feed occurs through the upper part of the reactor in the fuel-air mixture. Moving along the feed system, the fuel mixture heats up and gets into gas-dynamic vortex furnace. In the furnace solid fuel particles under high temperatures, are transformed into syngas. Impact of high temperature and flow velocity of thermochemical processes completely gasifies raw materials during a minimum time.



In the working zone of the reactor, the temperature is maintained at 1250 - 1400°C. This allows to convert carbon from the condensed to the gaseous state with efficiency up to 99.9% as well as to recycle / destroy many types of hazardous waste.

Characteristics of gas emissions confirmed the high ecological efficiency of the process during the recovery–concentration of dioxins and furans in the flue gasses without further purification does not exceed 0.1 NG / M<sup>3</sup>.

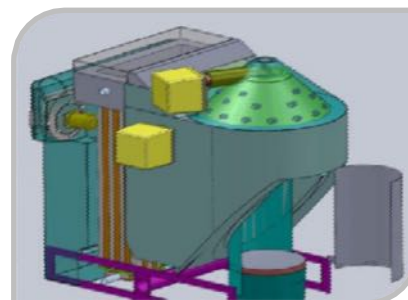
### ADVANTAGES OF THE “UNITEX” COMPLEX:

- Low formation of dioxins and furans, as a result of limited use of air.
- Minimum number of pyrocarbon and charcoal.
- Lower temperature of the process.
- Simple control system.
- Possibility of recycling sludge and hazardous wastes for the production of synthesis gas.

### STRUCTURE AND OPERATION OF THE “UNITEX” COMPLEX AND ITS MAIN CONSTITUENT PARTS:

Content of the "UNITEX" complex and its main constituent parts:

1. The power rack.
2. The gas generator including: (a) reactor, (b) steam recirculator, (c) ash removal device, (d) product-gas selection device and (e) ignition device.
3. High-pressure fan.
4. Rotary feeder.
5. Vibrogenerator.
6. Pneumatic pipeline.
7. Complete of electrical equipment and automated process control system (APCS).
8. Spare parts and accessories (spare parts).



### TECHNICAL DATA:

Type of equipment	Gasifier unit receiving raw materials
Operating pressure in the reactor, bar	0.004 - 0.01
Operating environment	steam-gas mixture
Operating temperature, °C	1250 - 1400
Performance (raw materials), KG per H	
Carbon conversion rate, %	99.9
Performance (syngas), Nm <sup>3</sup>	1000 ... 6000
Calorific value of syngas, Kcal / Nm <sup>3</sup>	3200 ... 5500
Chemical composition of syngas (estimated, nominal), %	
CO	15 ... 20
H <sub>2</sub>	15 ... 20
CH <sub>4</sub>	3 ... 6
CO <sub>2</sub>	0,5 ... 1
N <sub>2</sub>	30 ... 40
Power consumption, kW	10
Raw materials	liquid, solid, particulate carbonaceous feed, mix
Humidity of raw materials, %	not more than 70
Ash content of raw materials, %	not more than 40
Thermal power, max, MW	6.0
Packaging	Bulk frame 1 x 20' container
Size, L x H x W	6000 x 2500 x 2500
Weight, Kg	not more than 3000

SYNTHESIS GAS COMPOSITION	
H	39%
C <sub>0</sub>	24%
CO	26%
C <sub>2</sub>	8%
N <sub>2</sub>	3%
Cl	0%
LHV, MJ/Nm <sup>3</sup>	12 - 13

**Name:** "EXTRUDER".

**Description:** Innovative technology and equipment for heavy oil processing.

### DESCRIPTION OF THE TECHNOLOGY:

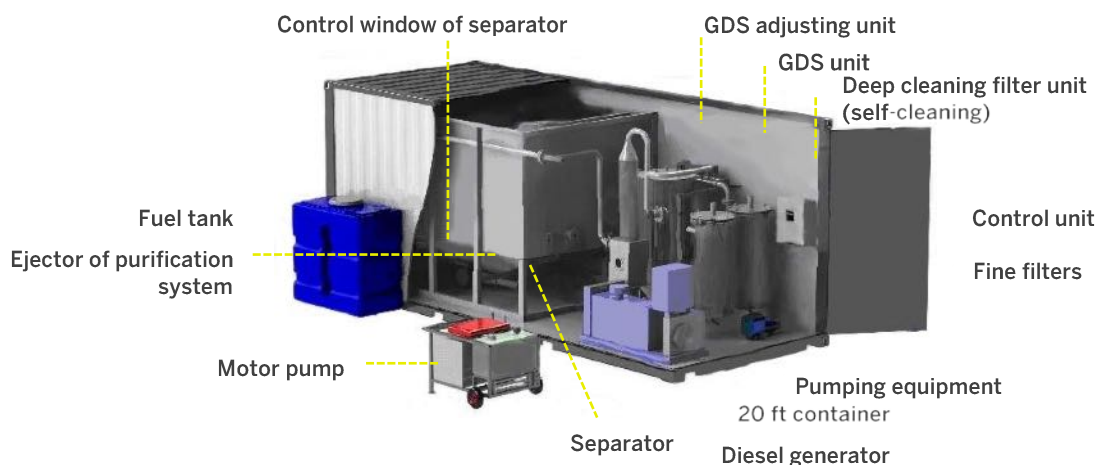
**Purpose of the technology** - addressing the issues related to complex profitable processing of "heavy" high-viscosity oil, as well as heavy refinery residues.

Currently recycling of "heavy" viscous-sulfur oil in a "classic scheme" is unprofitable, and in some cases impossible. Virtually all types of "heavy" high-viscosity oil contain a low concentration of "light" (Fuel) fractions. On installations with a "classical scheme", selection of these fractions is possible in relation to oil - not more than 25 - 30%. Ensuring an acceptable refining depth of such oil through the use of known techniques (thermal and catalytic cracking) requires large investments, high-interest rate of operating costs and working capital.

At the core of the new technology is a synergistic effect of influence of various physical and chemical factors on method of deep processing of heavy oil, its separation and obtaining a high yield of "light" oil (enriched with "light" fractions), reducing the sulfur content.

Basic scientific studies, practical experiments, were carried out over a long period of time and are protected by patents and copyright certificates.

Technology implemented is based on a shared resonance hydro cavitation plus microwave exposure on "heavy" viscous oil at low temperatures (significantly lower temperatures in comparison to usual thermal cracking). Proposed technology does use contain auxiliary agents.



### OUR TECHNOLOGY ALLOWS TO:

- Organize a mobile and profitable version "heavy" oil processing.
- Increase more than 2 times the output "light" fuel fractions.
- Combine several processing operations in a single unit.
- Reduce harmful effects on the environment.
- Reduce capital and operating costs.

Promising is option of technology implementation, in which the "light" fractions and a heavy residue re-mix again. Obtained as a result "synthetic" oil contains approximately twice as many fractions of the fuel than the original product.

Implementation of proposed technology can be of high interest for the processing of the "heavy" oil. In addition, the processing of heavy refinery residues under proposed technology will significantly increase the effectiveness of existing refineries of various capacities.

### ACTUAL STAGE OF THE PROJECT:

- Carried out theoretical research and experimental laboratory research.
- Created experimental stand (pilot plant).
- Carried out experimental separation of heavy oil from various deposits.
- Carried out works on protection of intellectual property rights.
- Patented the technology and equipment for the processing "heavy" viscous oil.

**Name:** "MED WASTE 100".

**Description:** Technology for processing of medical wastes with the use of gasification system.

**Certification:** Prepare for certification.

**Market potential:** Huge potential in EU and Middle East Countries.

**Number of LOI from hospitals and waste service companies already received.**



### DESCRIPTION OF COMPLEX:

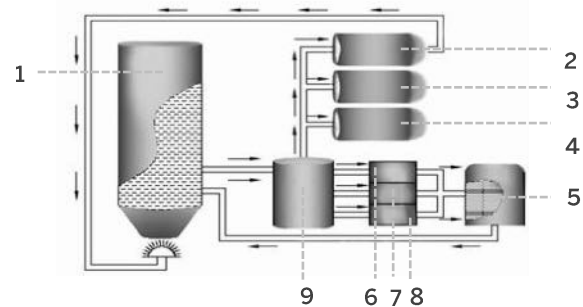
"MED WASTE 100" is highly automated device, designed for use in small and medium-sized hospitals and clinics, for environmentally sound disposal of potentially infected with solid medical wastes. Waste that past treatment in the future may be disposed of as normal domestic wastes. In contrast to the traditional technology for medical waste incineration, the use of "MED WASTE 100" does not form carbon monoxide, dioxins and chlorinated furans.

Medical waste contains hazardous waste (for example plastics, textile, and rubber gloves, needles, pathological wastes from surgery and autopsy, and pharmaceutical waste):

- **Sharps** Contaminated hypodermic needles, syringes, scalpel blades, Pasteur pipettes.
- **Cultures and Stocks of Infectious Agents** Also called "microbiological waste", this waste stream includes specimens from medical and pathology laboratories. Includes culture dishes and devices used to transfer, inoculate, and mix. Also includes discarded live and attenuated vaccines.
- **Human Blood and Blood Products** also known as "liquid medical waste", this waste stream usually encompasses waste blood, serum, plasma, blood products, and other potentially infectious materials.
- **Pathological and Anatomical Waste** Tissues, organs, body parts, and body fluids removed during surgery and autopsy.
- **Isolation waste** Generated by hospitalized patients isolated to protect others from communicable disease.
- **Contaminated Animal Carcasses, Body Parts, and Bedding** Also called "animal waste", this waste stream is relevant to animals or materials in contact with animals intentionally exposed to pathogens in research, biological production, or in vivo pharmaceuticals testing.

### PHYSICAL ASPECTS OF TECHNOLOGICAL STAGES OF THE MULTILoop CIRCULATION PYROLYSIS IN "MED WASTE 100":

"MED WASTE 100" process is fundamentally new technology of multiloop circulating pyrolysis, which provides a complete thermal decomposition of medical wastes (MW), disinfection of metal needles and metal tools at high temperature in the reactor (1) without oxygen. Hazardous components of -MW, which are formed as-gas mixture, circulates in multiloop system (5, 6, 7, 8, 9) until completely decomposed to low molecular components. The forming pyrolysis gas (2) burned in a special device, preventing the formation of toxic elements.

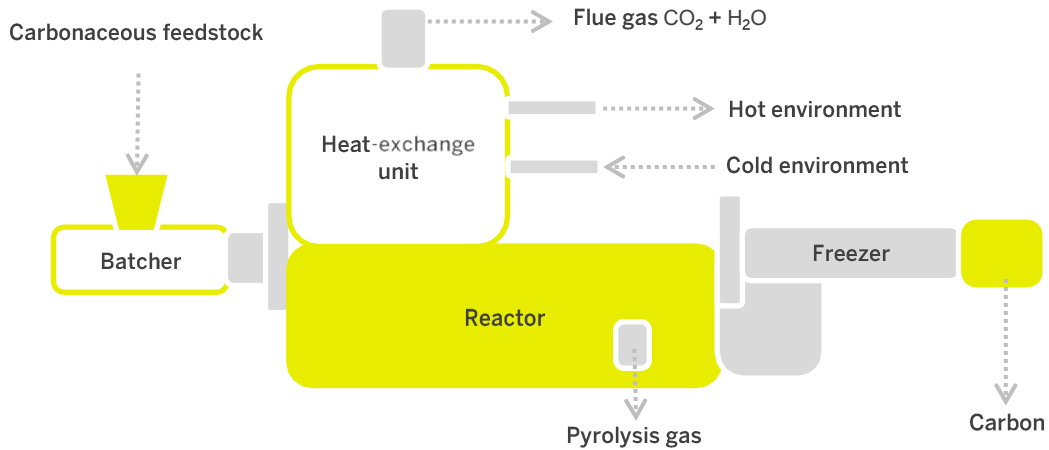


### ADVANTAGE OF THE TECHNOLOGY:

This is a complete solution for disposing of a various medical waste:

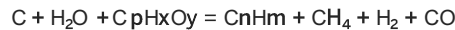
- **Environmentally friendly – carbon neutral to slightly negative.**
- **No air and surface water contamination.**
- **Ultra-low emissions technology.**
- **No pathogens, fliers, rodents.**
- **Produced liquid fuel.**
- **Good public relation.**

**SCHEME OF PYROLYSIS TECHNOLOGY:**



Thermal processing in a hermetically sealed reactor without air. Reaction produces pyrocarbon and pyrolysis gas. Allocated during pyrolysis volatile components, in the presence of carbon (involved as a catalyst), are transformed into pyrolysis gas.

Deep thermal decomposition of heavy fractions of the liquid components of the synthesis gas, through the use of cyclone circulation system, allows to receive light fractions liquid fuel, in its characteristics comparable with a diesel fuel.



Through conventional burning of wood (1 kg), the calorific value is 2 300 kcal / kg through the pyrolysis calorific value is 10 440 kcal / kg.

COMPOSITION	PERCENTAGE RATIO
C <sub>n</sub> H <sub>m</sub>	19 ... 29%
CH <sub>4</sub>	33 ... 45%
H <sub>2</sub>	12 ... 28%
CO	11 ... 18%
CO <sub>2</sub>	1,5 ... 2,5%

**ENVIRONMENT:**

Local and state laws and regulations prescribe that hazardous waste, contaminated with pathogen agents and infectious waste must be treated and disposed of in a safe and environmentally friendly manner.

“MED WASTE 100” is the result of advanced research aimed at developing technical solutions that are optimal for minimizing the impact on the environment and human health.

**BEST TECHNIQUES:**

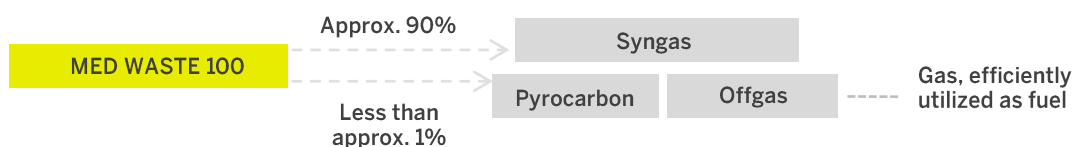
Best Available Techniques is the efficient technology of hazardous waste disposal and recovery of valuable materials.

The ecological safety is the primary requirement imposed on modern technological processes of domestic MW processing. The adoption of the multiloop circulation pyrolysis principle in waste processing allows to fulfill this requirement for the major part, in view of the deeper destruction of wastes. As a result, toxic high-molecular components are transformed into low-molecular ones so that their toxicity reduces.

Furthermore, toxic volatiles, which are present in the pyrolysis gas, are after-burned at a temperature of 1100 – 1200°C, so that provides complete decomposition of dioxins and furanes.

**PRODUCTS OF “MED WASTE 100” ARE:**

Syngas fuel, solid residue and gaseous compounds, according to the thermodynamic parameters and speed of process.



## AUTOMATIC CONTROL UNIT:

“MED WASTE 100” control system is based on “real-time” microcomputer technology, guaranteeing high reliability and safe operation. Main cycle phases and the machine’s actual parameters are displayed on the LCD panel during the cycle progress. Main physical parameters of the process (i.e. temperature, pressure, time and gas composition) are controlled and displayed. Control system is easy to use and programmable.

## SAFETY:

During the operation may have been occurring several risk situations. Actions and technical solutions to be taken in such cases have been verified to eliminate or reduce risks in the most appropriate manner by adopting adequate protection measures.

## OPERATION:

All control devices are clearly visible and the operating cycle has been designed to simplify and reduce as much as possible the need for operator's intervention. In terms of risk avoidance, the automatic operating system (automatic cycle selector) for the entire cycle guarantees maximum safety.

## DOCUMENTATION:

For a clear and concise documentation of cycle process, the control unit is provided with a printer, which is connected to the PC. In case of an uncompleted cycle, the printout will indicate the cycle failure and the cause of the failure. An additional RS485/RS232 PC and Advanced PC Windows-based software for monitoring, logging and control is available. A circular or trace strip chart temperature and pressure recorder, gas composition can be supplied on request.

## TECHNICAL DATA:

Thermal pyrolysis:	High temperatures and decomposed without oxygen
Heating method:	By clashes and friction of matter parts
Treatment cycle duration:	About 40 minutes
Nominal waste disposal potential:	50-500 kg waste/hour
Treated material aspect:	Different municipal organic and medical wastes
Treated material final volume:	About 0,5% of initial volume
Treatment cell volume:	About 330 liters
General control system:	Programmable logic controller (PLC)
Temperature measurement:	By resistance variation sensors
Cycle recording:	Time / temperature variation recording
Dust abatement:	In humid environment
Electrical power supply:	Core motor 15 Kw
Weight:	1500 Kg

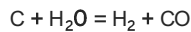
**Name:** "STABLE SYNTHESIS GAS".

**Description:** Technology of plasma normalization of gas, obtained after municipal and medical wastes processing.



**FEATURES STEAM-PLASMA PYROLYSIS:**

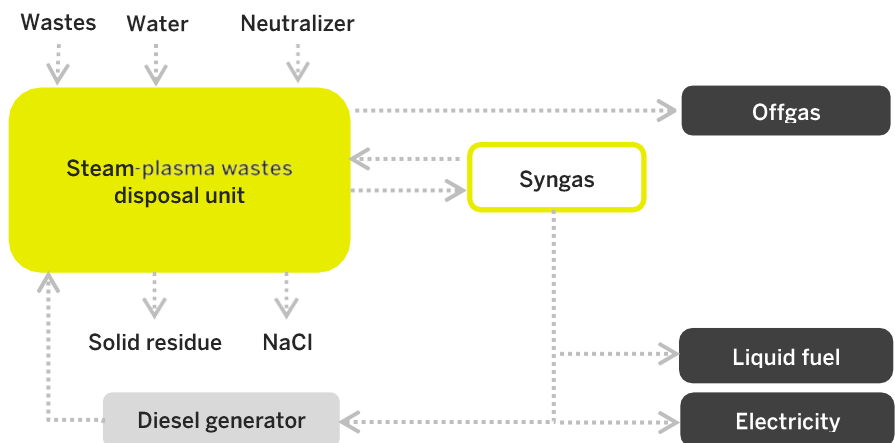
High temperature leads to the destruction of complex materials into simpler compounds. High reaction rates prevent the formation of complex formations (furans, dioxins). Water steam shifts the reaction toward complete removal of carbon:



**SCHEME OF STEAM-PLASMA RECYCLING PROCESS:**

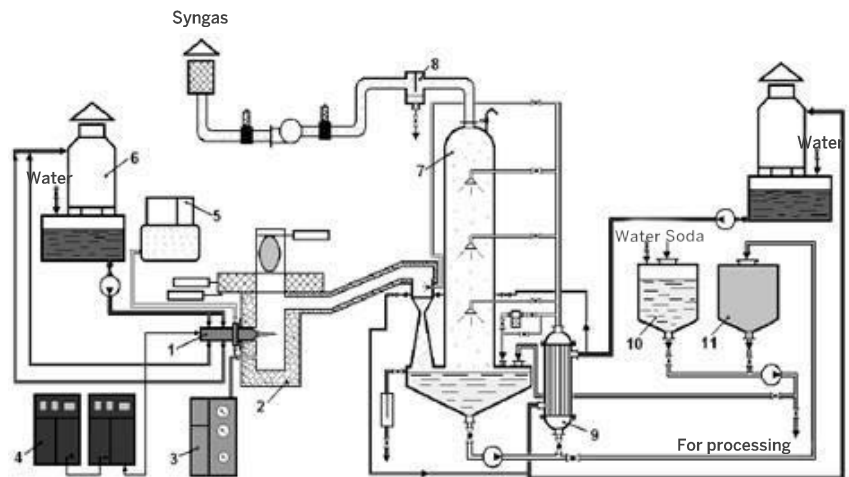


Working Plasmatron



**FLWSHEET OF STEAM-PLASMA UNIT:**

1. Plasmatron.
2. Steam-plasma furnace.
3. Steam generator.
4. Connected power supplies.
5. Compressor.
6. Cooling tower.
7. Scrubber Venturri.
8. Filter-drip tray.
9. Heat exchanger.
10. Tank with soda solution.
11. Tank with sludge.





Name: "FC".

Description: Diesel fuel and oil cleaning system, based on use of electric fields. Method is based on trajectory control of moving dirt particles using a focused electrostatic field.

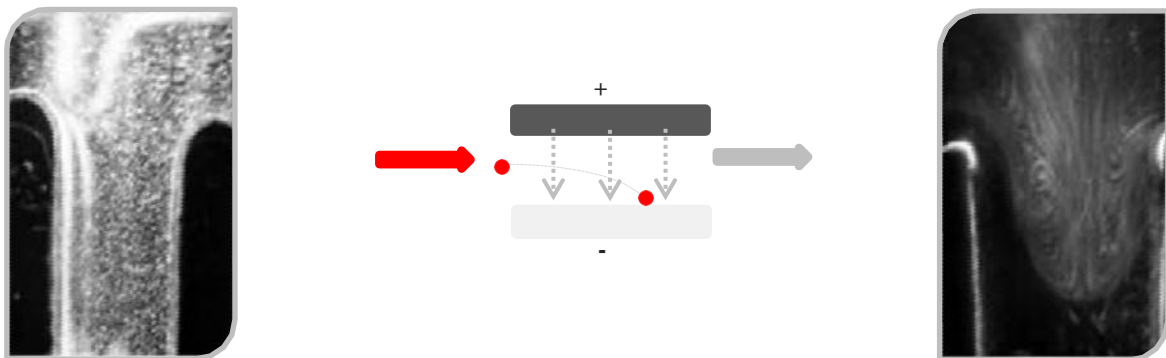


### DESCRIPTION OF TECHNOLOGY:

Our cleaning technology uses a "field" technology, the principle of operation of which is based on interaction of the forces due to the presence of electric fields, which possess the dirt particles, and external electric fields, generated by the system of focusing electrodes.

"Field technologies" allow the breakthrough in the field of fluids cleaning. As a result of "field" influence on the dirt particles, the latter are extracted from the liquid stream and are transported to the electrodes, where they are held on them in contamination cells.

All energy required for cleaning spent only for the creation of an electrostatic focusing field with specific configuration. Since the field is not dynamic but static - the costs of its maintenance are minimal.



### ADVANTAGES OF CLEANING SYSTEM "FC":

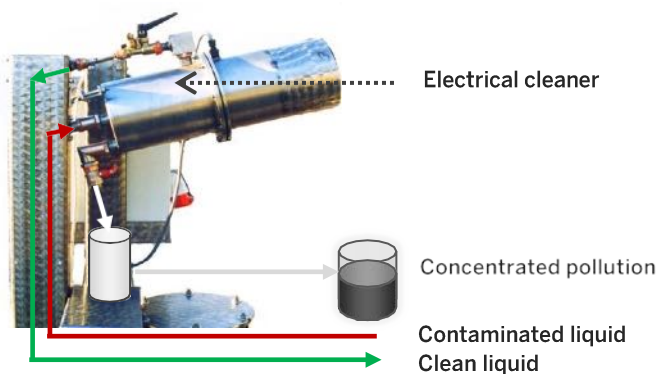
- **Guaranteed purity grade up to 0 - 1 NAS 1638.**
- **No need for costly filter cartridges.**
- **Resource of our cleaning systems is unlimited.**
- **Energy consumption per actual cleaning does not exceed 40 - 100W.**
- **Cleaning system allows washing and recovery 100% of characteristics unlimited number of times.**
- **Hydraulic resistance of a cleaner not exceeds 500 mm w.g.**
- **Cleaning options: submersible (filtration takes place in a container with liquid) or external (filtration occurs outside of the tank with the liquid).**

### TYPE AND COMPOSITION OF REMOVABLE CONTAMINANTS:

- Silica particles (sand dust) particles of any type of soil.
- Oxides of metals, wear of friction pairs products (metals and do not metals).
- Lapping technological paste, destruction particles of membrane filter elements.
- Fibers of any nature, emulsion water, dissolved water.
- Contamination from the process of degradation of the fuel during storage and production.
- Contamination from fuel storage tanks and pipeline systems, as well as from delivery vehicles.
- Dirt trapped in the fuel from the outside through vent valves of tanks and from other sources.
- Contamination from the wear process of hydraulic equipment.
- Pollution in the form of water in all states of aggregation and in all kinds (free, emulsion, dissolution).



## SCHEME OF THE CLEANING PROCESS:



Collected in electro cleaner dirt

## CLEANING RESULTS:



Before cleaning 13 - 17 class according to GOST 17216    After cleaning, 2 - 4 class according to GOST 17216

## TECHNICAL DATA:

Name:	"FC"	
Type:	Stationary	Mobile
Maximum output:	5000 l/hours	1000 l/hour
Ensures cleanliness class in the system not lower than, class GOST 17216:	2 - 4	6 - 7
Dropout rate by fractions, % not less than:	90	50
Cleaning time of the turbine oil system with the oil capacity of 100 tons, at an initial purity class 15:	5 - 7 days	25 days
Continuous working time:	24 hours / day	24 hours / day
Stopping time of system for regeneration, hours (not more):	0	6
Type of regeneration:	automatics	operator
Built-in pollution analyzer:	yes	no
Built-in water content analyzer:	yes	no
Counter of purified oil:	yes	no
Control system for installation units parameters:	yes	no
Availability of status protocol for the installation units:	yes	no
Automatic failure warning system:	yes	no
System of autonomous power backup:	yes	no
System of protection against power surges:	yes	no
Unauthorized tampering system:	yes	no
Backup system in case of failure:	yes	no
Concentrate contaminants accumulator:	yes	no
Concentrate contaminants extraction system:	yes	no

## OPTIONS FOR COOPERATION:

1. Equipment for cleaning.
2. Provision of services for cleaning.



**Name:** "MAK-01-EM".

**Description:** Small autonomous complex, designed for water supply of potable and industrial water purification and desalination.

### DESCRIPTION:

"MAK-01-EM" is a small autonomous complex, designed for water supply of potable and industrial water purification and desalination of industrial, household, and natural waters and brines, liquid waste disposal. The principle of operation of the equipment is based on the controlled pulsed influence of electric and magnetic energy on the aqueous liquid.

"MAK-01-EM" complex possibilities include its widespread use for purification and desalination of wastewater and marine waters, surface and underground waters, production of technical and drinking water and utilization of liquid waste in industry, agriculture and transport, for equipment of cottages, residential high-rise buildings, towns and settlements with drainless water consumption system, supply of drinking water and electricity during emergencies and other.

Peculiarity of complex is its multifunctionality. It can be used as a standalone environmentally friendly device for desalination of marine water and the production of drinking and service water, for purification and utilization of domestic and industrial liquid waste, for heating of houses (premises), for production of electricity or gas.

### TECHNOLOGICAL PROCESS OF THE COMPLEX:

- 1) **DISPERSANT** for the grinding of organic, mineral and other compounds in the processed aqueous liquid preparation of the emulsion and suspended particles with sizes 1 micron or less.
- 2) **SURGE-CURRENT GENERATOR** that generates the energy necessary to break the molecular bonds of the cleaned aqueous liquid, and regulating its amount depending on the selected mode: cleaning, disinfection, water desalination or gas generation.
- 3) **POWER UNIT (OPTIONAL)** generating electricity for autonomous operation of the complex. It utilizes fuel cells, metal hydride filters and collector of hydrogen gas, produced simultaneously during operation of the complex and desalination of water and which is a fuel for internal fuel cell generating electricity.
- 4) **MAGNETIC CLASSIFIER**, purifying water from salts, metals, minerals and other compounds using the energy of magnetic fields and vortex flow of water.
- 5) **WASTE DISPOSAL UNIT** for monitoring the presence in liquids of toxic waste water or radioactive substances and their neutralization, collection of the solid phase of all nanostructures obtained in the process of water purification, in a concentrated liquid or dry form for their further use or operative destruction.
- 6) **BLOCK OF WATER ACTIVATION** for drinking water production, operational control of its qualitative composition, recovery of physical and chemical composition and the percentage in it of micro- and macroelements as well as for activation of such physical characteristics as conductivity ( $\mu\text{S}$ , microsiemens), acid-base balance (pH), redox potential ORP (mV). Block is also used for preparation and production of saline and structured water.

### PRODUCTIVITY:

"MAK-01-EM" complex productivity of 1 m<sup>3</sup> / h allows to provide with high-quality water (at a rate of 100 liters per capita per day) residents of the small village of more than 200 people.

Complex with greater (given) productivity consists of modules, which are based on "MAK-01-EM". It enables scaling of equipment, without changing its life-span, significantly increasing the reliability, economy, and safety.

Operating modes of complex provide quality, sterility and physical and chemical indicators of water, complying with regulations. Complex is equipped with a remote control system.

## ENVIRONMENTAL SAFETY:

Safe in operation complex not only regenerates the polluted water, but also neutralizes toxic, poisonous or radioactive substances, produces gas (hydrogen) and electricity.

## SIZE:

Compact and technologically reasonable placement of assemblies and blocks in the construction of complex allow to manufacture it as a module with the size of 1100 mm x 1100 mm x 1350 mm.

## LIFE SPAN:

With a daily continuous 20-hour operation of the complex major overhaul stipulated after 10 years of its operation.

## SAFETY:

Complex is equipped with a system of protection against fire and explosion of the gas mixture, formed in the concentrator during the regeneration of contaminated water, from obtaining and accumulation thereof of gas (hydrogen).

## AUTONOMOUS POWER AND THE GAS GENERATION:

Complex can operate autonomously, without the use of electric energy from external networks, due to its own power unit. Power unit is designed to produce electricity, as during purification and desalination of water as well as without it. In the power unit are used metal-hydride gas (hydrogen) collectors that feed the fuel cells, which produce electricity.

## DESALINATION OF SEA WATER AND ITS PREPARATION TO THE REQUIREMENTS OF DRINKING WATER:

In "MAK-01-EM" used the method of demineralization (desalination) of seawater by means of electric and magnetic systems. The complex has a block of bringing water quality to the level of drinking. It includes a recovery of physical and chemical composition system, activation and water quality control system. Block is also used, if necessary, for the production of saline and distilled structured water.

## ECONOMIC FEASIBILITY:

Technology and equipment related to priority areas of science and technology in solving problems of water conservation and fresh drinking water and environmental security, by regenerating the water used, neutralization and utilization its wastes as well as the further development and implementation of energy-saving alternative source of energy derived from cleaning and processing of domestic, agricultural, medical and industrial liquid waste.

### Prospects of development:

- Use in drainless water systems.
- Water purification and drinking water production.
- Production of emulsions and nanopowders.
- Manufacture of medical solutions.
- Utilization (destruction) of toxic (poisonous) substances.

## TECHNICAL DATA:

NAME OF INDICATORS	CALCULATION FORMULA	VALUE INDICATORS
Productivity on the water, m <sup>3</sup> per hour	1.3 m <sup>3</sup> x 1 hour	1
Volume of purified water per day, m <sup>3</sup> per day	1m <sup>3</sup> / hour x 20 hour	20
Cost of purified water when running on an external network, \$ / hour (1 kW / hour = \$ 0.5)	10 kW / h per hour x 1.0 x \$ 0.5	5
Cost of purified water during the autonomous operation, \$ / hour (1 kW / hour = \$ 0.0)	10 / kW / hour x 1:00 x \$ 0.0	0.0
Cost of 1 m <sup>3</sup> of drinking water during the autonomous operation, \$	-	0.10

**Name:** "WATERLIFE".

**Description:** Device is designed to activate the water (through the ionization by hydrogen), which has a therapeutic effect on various pathologies of the human organism.

**Certification:** Not required.

**Latest supplies:** Republic of Austria, United Arab Emirates.



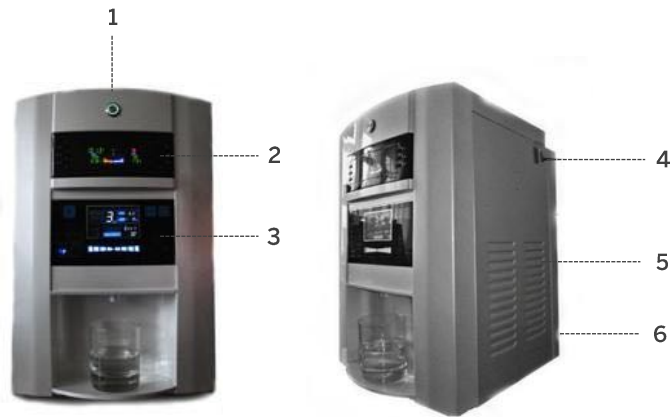
**DESCRIPTION:**

"WATERLIFE" activates water (through the ionization by hydrogen) to provide beneficial and therapeutic effects on the human body. Results from the use of activated water noticeable within a few days.

Water contained in our body is strictly structured, unlike most of the water we drink. Therefore, the water that flows into the body shall be as well structured. It consumes more energy and time.

**SCHEME OF THE DEVICE:**

- 1. Bottle-header.
- 2. Display
- 3. Touchpad.
- 4. On / Off button.
- 5. Grille of the cooling radiator.
- 6. Network cable.



**TECHNICAL DATA:**

Power	220V – 50 Hz
Cooling capacity	90 W
Type of cooling, refrigerant	Compressor, (R134a)
Temperature and cooling capacity	5 – 10 °C
Energy consumption	1 KWh * h / 24
Ambient temperature	10 – 30 °C
Energy efficiency class	Class

**DIFFERENCES IN STRUCTURE ORDINARY AND ACTIVATED WATER:** Normal water has a chaotic structure and chaotic arrangement of the molecules, structured water - exactly ordered

**PARAMETERS OF WATER AFTER THE ACTIVATION:** Oxidation-reduction potential (ORP) (- 430 mV), pH - (7.5).

**HAEMOSCANNING BLOOD TEST RESULTS AFTER THE USE OF ACTIVATED LIQUIDS:**

> **State of the blood before the activated water:** Featured coin columns of erythrocytes indicating a weakening (or absence) of an electrostatic thrust.

> **State of the blood after the use of activated water (200 ml):** Analysis shows a noticeable difference. Erythrocytes are not glued together, their mobility improving, what contributes to the fulfillment of their functions of providing cells with oxygen.

## LIVING WATER:

"LIVING WATER" (catholyte) has a pH greater than 8, AFP - 800 mV. Living Water has a high immunostimulating, regenerative and detoxication properties, meaning it can be used successfully to treat a variety of diseases.

### Living water:

- Natural bio-stimulator, it perfectly restores the body's immune system, provides antioxidant protection, especially in combination with vitamins, is a source of vital energy; activates all bioprocesses, increases blood pressure, improves appetite, metabolism, improves overall health;
- Heals quickly various wounds, including stomach ulcers and 12 - duodenal ulcers, decubitus ulcers, trophic ulcers, burns; softens the skin, gradually smooths wrinkles, eliminates dandruff and improves hair structure;
- In agriculture, the living water is an indispensable tool. Living water greatly increases the harvest of fruit and berries; dried flowers come to life if they put in a vase filled with a living water;
- Enhances the effect of medicinal plant preparations, which takes the patient; plants on the windowsill also gain "live" force under the influence of spraying and irrigation the living water.

Living water quickly loses its biological and therapeutic properties since it is active and unstable system. If stored in a closed container and in a dark place - it must be used within two days.

## DEAD WATER:

"DEAD" WATER (anolyte) has a pH of less than 6, ORP + 1000mV. Dead water is an acidic solution and has strong antibacterial properties, it is an excellent disinfectant.

### Dead water is used for:

- Disinfection of clothes, utensils, bandages and other medical materials, and facilities.
- Processing of facilities with a sick, in order to avoid re-infection and infection of relatives.
- Processing of linen and bed, if the house is insects infested.
- Diseases of throat, nose, ears. Gargling - treatment and prevention of influenza and acute respiratory infections.
- Lowering of a blood pressure.
- Calm nerves, relieve insomnia, relieve pain in the joints of hands and feet, destruction of the fungus, treatment of stomatitis, dissolution of stones in the bladder.

Dead water rather long retains its properties - during 1 - 2 weeks if stored in a closed container.



## APPLICATION OF "WATERLIFE":

**SKIN AND HAIR:** hair wash, hair care, eliminating foot odor, skin irritation (after shaving), lethargy, excessive flaking of the skin, acne, removing dead skin from the feet.

**DISEASE AFFECTING SKIN:** fungus, diathesis, hemorrhoids, anal fissures, allergies, psoriasis, psoriasis.

**SKIN DAMAGES:** cuts, bruises, scrapes, burns, sores, chronic fistulas, postoperative wounds, pressure ulcers, sores, boils, ringworm, eczema.

**EYES AND MOUTH:** conjunctivitis, barley, toothache, periodontal disease, stomatitis.

**DISEASES OF THE THROAT AND RESPIRATORY SYSTEM:** sore throat and catarrh of the upper respiratory tract, acute respiratory infections, asthma, bronchitis, influenza, herpes (cold), cold neck, prevention of acute respiratory infections, colds during epidemics.

**DISEASES OF THE DIGESTIVE SYSTEM:** gastritis, gastric ulcer and 12 duodenal ulcer, diabetes, the pancreas, inflammation of the colon (colitis), inflammation of the liver, jaundice (hepatitis), cholecystitis (inflammation of the gallbladder), intestinal worms, dysentery, diarrhea, constipation, heartburn, improve digestion.

**OVERALL HEALTH:** headaches, high blood pressure, low blood pressure, prevention of insomnia, irritability, feeling better, the normalization of the body.

**LOCOMOTORIUM, BLOOD VESSELS:** pain in joints of the hands and feet, deposition of salts, swelling of the hands and feet, arthritis, arthritis, low back pain, sciatica, rheumatism, varicose veins, bleeding from ruptured nodes.

**UROGENITAL:** prostate adenoma, coleitis (vagininitis), cervical erosion.



**Name:** "COMPLEX CLEANING AND RECOVERY OF WATER COMPLEX".

**Description:** Technology of drinking and industrial water supply, of purification and desalination of industrial, household and natural waters, of liquid wastes disposal.



### IMPORTANCE:

One of the most promising and environmentally friendly methods of purification of industrial, domestic and waste waters, demineralization of ocean water, sea water, surface and underground saltwater reservoirs, water preparation and drinking water production, gas collection and disposal of liquid wastes is a method based on use of controlled electrical and magnetic energy, which form reaction processes in water and water-gas environments.

In this regard, highly effective is the universal method of simultaneous influence of electric discharges, ultrasonic radiation and magnetic fields on the liquid to be purified.

We have developed laboratory equipment that generates the energy needed to break the molecular bonds of aqueous liquid to be cleaned or desalted, and regulating its amount, depending on the mode selected: cleaning, disinfection, water desalination and obtaining of gas.

Principle of operation and the technology that is the basis of the equipment is similar to the natural processes of cleaning and restoration of water in the atmosphere during rain and thunderstorms with lightning discharges.

#### Blocks used in the construction of the laboratory complex:

- pulse currents of high voltage generator,
- generator of ultrasonic radiation,
- magnetic systems,
- multichannel reactor
- control units,

allow in each selected mode maximize the use of its operational capabilities for cleaning and desalination of mineralized and polluted waters, brines, production of drinking water, gas, and electricity.

### PURPOSE AND SPECIFICATIONS:

Laboratory complex intended for supply of potable and industrial water, purification and desalination of industrial, domestic, and natural waters and brines and liquid wastes disposal. Main structural of the complex are:

- 1) **DISPERGATOR** for crushing organic, mineral and other compounds in processed aqueous liquid and preparation of the emulsion with size of suspended particles 1 micron or less.
- 2) **CURRENT PULSE GENERATOR** that generates energy necessary to break the molecular bonds of the aqueous liquid to be cleaned, and regulating its amount depending on the selected mode: cleaning, disinfection, desalination or obtaining of gas;
- 3) **POWER UNIT** (additional equipment), generating electricity for autonomous operation of the complex. It utilizes fuel cells, metal hydride gas filters and storage of hydrogen produced simultaneously in the process of processing (desalination) of water, and which is a fuel for internal fuel cells generating electricity.
- 4) **MAGNETIC CLASSIFIER**, purifying water from salts, metals, minerals and other compounds while using the energy of magnetic fields and vortex flow of water.
- 5) **WASTE DISPOSAL UNIT** for monitoring the presence in liquids of toxic wastes or radioactive substances and their neutralization, collection of the solid phase of nanostructures obtained in the process of water purification, in a concentrated liquid or dry forms for their further use or operative destruction.
- 6) **WATER ACTIVATION BLOCK** for drinking water production, operational control of its qualitative composition, recovery of physical and chemical composition and percentage content in it of macro- and microelements, as well as activation of the physical characteristics, such as conductivity ( $\mu\text{S}$ , microsiemens), acid-base balance (pH), redox potential ORP (mV). Block is also used for the preparation and production of physiological solutions and structured water.



## APPLICATION OF COMPLEX:

Possibilities offered by the technology include its widespread use for cleaning and desalination of seawater and wastewater, surface and underground waters, production of technical and drinking water and disposal of liquid wastes in industry, agriculture and transport, when equipping cottages, residential high-rise buildings, towns and villages with drainless water systems, drinking water and electricity supply during emergencies et cetera.

Main feature of the complex is its versatility. It can be used as a standalone device for environmentally friendly desalination of seawater and production of drinking and service water, purification and disposal of domestic and industrial liquid wastes, heating of cottages (premises), obtaining electricity or gas.

## DESALINATION OF SEA WATER AND ITS PREPARATION TO THE REQUIREMENTS OF DRINKING WATER:

Complex uses method of desalination of seawater by means of electric and magnetic systems. It has a block for bringing water quality to the level of drinking, which includes also includes a system of recovery of physical and chemical composition, activation and water quality control systems.

## BIODIESEL PRODUCTION

For already 13 years, a company named Alpha Biofuels Pte. Ltd. (Singapore) has been producing biodiesel at an industrial scale in a flow mode using our very compact technology.



Every year the company produces biodiesel in the volume of 1 echelon with 50 tank cars (see the photo below).



The innovation method of the production of biodiesel was described in our paper:

A. Litinas, S. Geivanidis, A. Faliakis, Y. Courouclis, Z. Samaras, A. Keder, V. Krasnoholovets, I. Gandzha, Y. Zabulonov, O. Puhach, M. Dmytriyuk, "Biodiesel production from a high FFA feedstock with a chemical multifunctional process intensifier", *Biofuel Research Journal* **7**, No. 2, 1143–1177 (2020);

[https://www.biofueljournal.com/article\\_107960.html](https://www.biofueljournal.com/article_107960.html)



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