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ECOLOGO END ENERGY-SAVING TECHNOLOGIES WITH THE USE OF WATER TREAT IN THE MAGNETIC FIELDS

Abstract. *The current hypotheses of water structure and influence of the magnetic field on the change in its structure have been analyzed. The hypotheses of the feasibility of using high-frequency electromagnetic fields to enhance their impact on the water structure and the stability of this process have been formulated. Experimental studies using water treated in the high-frequency electromagnetic fields for the ecoconcrete production have been carried out.*
Keywords: *magnetized water, field density, wave motion frequency, water processing time in the field, water velocity.*

Introduction

Since the mid XX th century, the Soviet Union began conducting scientific studies and practical application of magnetic water in different industries [1–6].

Y.G. Dorfman [7] examined the relationship between magnetic properties and structure of matter. However, along with significant achievements in scientific research and practical application in many sectors of the economy: thermal power, building materials, agriculture, medicine, etc. there have been cases of results instability. This was due to nonstrict hypotheses on the water structure model and, consequently, on the effects of magnetic fields on it.

Meanwhile, Y.I. Frenkel [8] believed that the liquid in its structure is closer to the solid body, rather than gases. In liquids, as well as in solids, thermal vibrations of the particles occur around some equilibrium positions, and, unlike in solids, in liquids oscillating particles do not remain in one place for a long time, but abruptly move from one equilibrium position to another one. Based on the ratio obtained by Y.I. Frenkel it turns out that each molecule of water before moving from one equilibrium position to another one makes 1000 vibrations in the original position. Based on this Y.I. Frenkel concluded that the water particles are mostly "sedentary". Applying this conclusion for water, taking into account the theory of its cluster structure appeared later on we can assume that to destroy clusters with significant savings of heat energy it is necessary to provide the vibration frequency of water molecules of more than 1 kHz. In this case the equilibrium will be destabilized, and the clusters will break down rapidly.

Thus, the time of monomolecular water creation by molecules other than the "biofield", i.e. charged, should be decreased dramatically and gain stability.

The main part

After studying the application of the theory of magnetic water and significant achievements in scientific researches and practical application in building materials production we have proposed technologies of concrete products manufacture using high-frequency electromagnetic devices for magnifying "I", as well as the device "II".

Magnetic water was received on the stand with two devices that can operate independently from each other [9].

The task of the research is to carry out comparative studies of the optimization process of magnetic water according to this technology, field parameters and water-cement ratio of the initial formulation of products. To conduct products research after a certain period of time (28 days) (strength gain) using steaming and without steaming. To consider the effect of magnetic water as an activator, with the use of components to obtain concrete with damaged structure and of various chemical compositions, with various additives.

For the experiment over 200 samples of concrete cubes (70x70x70) have been prepared according to the recipe (for 1 m^3 of concrete) in two ways:

1) cement (ПЦ I 500) – 250 kg/m^3; sand – 760 kg/m^3; gravel of fraction 5...10 mm – 350 kg/m^3, 10...20 mm – 810 kg/m^3; water – ordinary water – 193 l/m^3,

2) the same composition but instead of ordinary water magnetic water.

Magnetic water was prepared with the help of magnets "I".

The results of experimental measurements of the magnetic fields generated by the device "I": the magnetic resistant sensor KMZ 10C with susceptibility coefficient 1.5 (mV/V)/(kA/m) has been used. According to the technical documentation the device has two operating modes (1, 2), for work with ferrous and nonferrous metals. The water processing takes place in the regime of preventing scale formation and in the regime of existing deposits.

Accordingly, the magnetic field intensity has been measured in two modes:

Cleaning 1 (CL1).

The signal configuration consists of high-frequency pulses that generate a field with strength of 0.23 T to 0.43 T. Each signal consists of pulse packets (packets for 8 pulses). The pulse length is 80 ms with a period of 75 ms between pulses and the interval between packets 1500 ms.

Cleaning 2 (CL2).

The signal configuration consists of high-frequency pulses that generate a field with strength of 0.23 T to 0.43 T. Each signal consists of pulse packets (16 pulses packets). The pulse length is 35 ms with a period of 20 ms between pulses and the interval between packets 1300 ms.

Note: The figures were taken directly from the surface of the core.

Samples prepared in the form of cubes, with a working section 70x70 have been made in batches (with or without steaming up to 28 days). The steaming chamber (t = 80° C = 6 h) has been used for steaming.

The results of these studies are shown in (Fig. 1, 2, 3). The determination of the samples compression breaking strength wasper forme don’t hepressinac cordance with current standards.

On the 7^{th} day the strength of the samples prepared with the magnetic water is 20–40% more than the strength of samples prepared with ordinary water. On the 7…11^{th} day samples prepared with the magnetic water gain the same strength as the samples with ordinary water on the 28^{th} day. On the 28^{th} day the strength of the samples prepared with magnetic water is 7...12% more than that of the samples prepared with plain water.

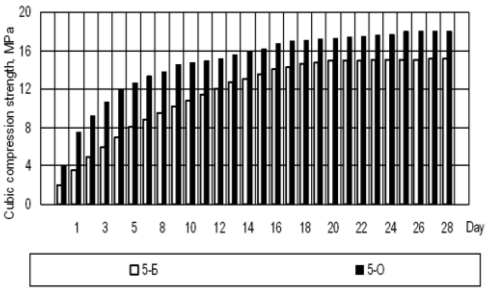

Figure 1 – Dependence of the samples strength on time, 5 – experimental series number. Series «Б» – samples prepared by classical technology using ordinary water. Series "О" – samples prepared with magnetic water. Б-5, W/C = 0.71 (slag Portland cement), CL2 installation mode

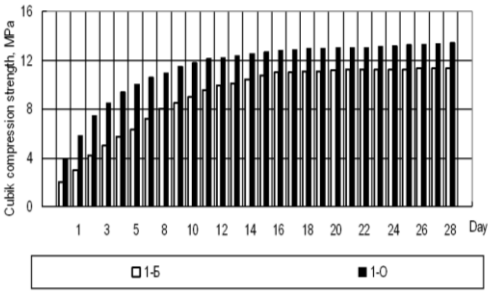

Figure 2 – Dependence of the samples strength on time, 1 – experimental series number. Series «Б» – samples prepared by classical technology using ordinary water. Series "О" – samples prepared with magnetic water.1-О, W/C = 0.72; CL2 installation mode

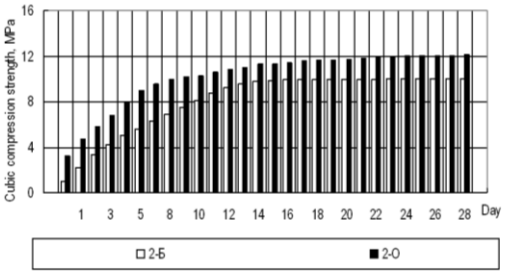

Figure 3 – Dependence of the samples strength on time, 2 – experimental series number. Series «Б» – samples prepared by classical technology using ordinary water. Series "О" – samples prepared with magnetic water. 2-Б, W/C = 0.61 (15% from the proposed formulation), CL2 installation mode

The Dissertation tells about the substantiation of influence of magnetic treatment of purified water on the kinetics changes the physical characteristics of its structure and the impact of these changes on the efficiency of energy of heating systems. The existent scientific hypotheses of influence of magnetic-field are analyzed on the molecules of water, features magnetic water that can be used in many spheres of vital functions, power engineering specialists etc. Application of technologies with the use of magnetic water assist an economy and maintenance of resources.

The European citizens spend more than 90% of their time in a confined space. More than 40% of people in enclosed spaces complain of the worsening state of health and various inconveniences (European Construction Technology Platform, 2005). Scientific studies have shown that the deformation process of nonmetallic building materials such as concrete, plaster, dry mixes of different origin is connected with the action of microorganisms. These structures damage is caused by the influence of microorganisms leading to a synergy of different types of corrosion.

Microbiological corrosion of concrete is found in residential and industrial buildings. The external manifestations of damage of building materials, products and designs by microorganisms are blistering, cracking, delamination of entire fragments of plaster, on the floor, ceiling and walls the presence of dark spots (Fig. 4). Often these phenomena are accompanied by a variety of climatic conditions (high humidity, temperature extremes). Air pollution can cause respiratory and cardiovascular diseases, cancer, premature birth, increased infant mortality, neurological and psychiatric disorders, decreased immunity. 72% of residents of contaminated areas suffer from chronic bronchitis, diseases of the respiratory system. There is a clear link between air pollution and extensive myocardial infarction.

For prevention and creating a safe environment it is necessary to:

– reduce consumption of energy and material resources throughout the life cycle of buildings and structures, ranging from the manufacture of materials for buildings (based on strength increase) and materials biodegradation problems, site selection and further during design, construction and operation (creation of mircroclimate conditions, including in the working area of buildings and structures);

– expand and complement the classical building design with concepts of saving, serviceability, durability, impact on the environment and human health due to the resource saving (electricity, water and other resources usage taking into account progressive methods, including nanotechnologies as well)…

Figure 4 – The microbiological corrosion in industrial building

At residential, public and industrial buildings and structures, agricultural buildings, meat and dairy and livestock complexes the use in the operation of too

high or low indoor temperatures, humidity, lighting, air quality (carbon dioxide, smoke, hazardous fine and coarse particles, dangerous radiation, microorganisms, etc.), noise, allergens, harmful gas, the improper disposal of waste water (Fig. 5), a solid or liquid waste have a detrimental effect. They are dangerous to human health and adversely affect the quality components in the operation of building materials.

Figure 5 – Biological corrosion in animal farm

The adverse effect on the human body is caused by a set of interactions between the material, environment and man, according to the dynamics of possible current state of relations "environment-man".

About 20% of the European citizens have an allergic reaction to the mites and lower fungi (caused by biodegradation of materials and structures, and others). The dominance of asthma and allergies in residential buildings is also increasing. In Europe one of seven children suffers from asthma and in Western Europe the number of such children is ten times higher than in Eastern Europe (European Construction Technology Platform 2005). The main factors of concrete deterioration or corrosion are the environmental effect, aggressive atmosphere, changes of the indoor climate. At the same time the main threat to concrete is the same thing that contributes to concrete hardening – water and gas. Today it is accepted to distinguish several types of concrete corrosion depending on the characteristics of its triggering processes.

Chemical corrosion of concrete is most widely spread. Most often it is caused by the interaction of the surface layers of the concrete with atmospheric moisture and carbon dioxide contained in the air. Ensuring an effective response to biological corrosion of various building materials, products and structures caused by the vital activity on them or in them of various microbes and fungi, is becoming more and more acute scientific and practical problem in the field of construction and operation of residential and industrial buildings and structures (biological corrosion). Currently, more than 40–50% of the total number of recorded in the world injuries are related to the activity of micro-organisms.

There was done the experimental study of the influence of magnetic field on the structure and physical and chemical properties of water. It was found that the magnetic field significantly affects the kinetics of physical and chemical properties of water. With the experimental methods, there was developed a physical model of turning water into monomolecular structure with positively charged molecules, weak electrolyte. This causes an increase of speed and power in interactions of these molecules with molecules of other substances including internal and external surfaces of materials. There was done a full-scale study of the influence of the reagentless water treatment at different stages of heating supply which confirmed an increase in their energy efficient systems to 40%.

Conclusions

Our studies confirm the practicability of the magnetic water use as an activator in the production of construction materials, which will let use energy-efficient nanotechnologies in the production. This requires a deep study of complex physical and chemical systems, which is scheduled by the author in the following series of experiments.

The use of water treated with high-frequency electromagnetic fields obtained from devices "I" (Ilios) lets reduce energy end ecologic consumption during heat treatment of concrete (steaming) [10].

To receive detailed experimental data on the magnetic field of the device "II" (Kalmat) is a subject for further study: with the purpose to warn potentially adverse environmental an economic consequences it is recommended to use the latest advanced technologies (plasticizers et al.), activated (magnetic) water in the concrete and reinforced concrete production.

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