**UDC 62 229. 316. 0002. 51**

# INTRODUCTION OF MAGNETIC HYDRODYNAMIC RESONATORS WHEN CLEANING VEGETABLE OILS

**P.I. Osadchuk**
*Odessa State Agrarian University*

*The article analyzes the mechanism of influence of a magnetic field on a solution of oil and water during the process of hydration. Based on the well-known theories of magnetic field influence on water dispersion solutions, their vision of the theory of the course of this process is presented.*

**Key words:** water, water solution - oil, magnetic field, hydration, chemical reaction.

**Introduction.** The scientific studies of many laboratories have shown that the danger to human health is not so much the individual components of oils and fats, but the products of their oxidation and decomposition. Not cholesterol itself causes the formation of atherosclerotic plaques, and the products of its oxidation, which form with saturated fatty acids, the ester bonds. Oxidized derivatives of cholesterol and other lipid components that are part of unrefined fats can also be the cause of severe diseases such as ischemia and even cancer. At the same time, hydroperoxides themselves are not always dangerous to health, but products of their decay with the formation of free radicals present a real threat to human health. Applied at this time, the technology of a complete cycle of refining and modifying vegetable oils consists of chemical, physico-chemical and physical processes. Hydration of phospholipids is the first stage of a complex refining process that determines not only the quality of butter, but also the economic efficiency of the subsequent stages of its processing. Phospholipids are capable of various transformations and interactions, for example, they react with water. On this basis, at this time, the hydration process at t = 60 ... 80 0C, which leads to oil waste at the separation of phosphorus-retaining emulsion. Moreover, the process of hydration with water only removes hydrated phospholipids by 50%. The isolated phosphate emulsion together with fats is used for fodder purposes. At present, oil production is gaining ever more importance in the oil and gas industry. In this regard, the industry has a number of tasks, one of which is to reduce the content of phosphatides in hydrated vegetable oils [1-3].

**Problem.** Based on literary sources in the field of agriculture and food industry, the influence of physical fields on the processes of oil purification has not been studied. And the study of the influence of magnetic fields on the cleaning of oils in general was not found.

**The purpose of research.** One of the most common ways to purify vegetable oil from phosphorus-containing substances is to treat it with weak solutions of saline solution or water. To intensify the removal of phosphorus-containing substances as one of the means is the use of physical fields, and in this article the use of magnetic

fields. At this time in the process of hydration, the phosphatides content is reduced to 0.2%, which according to the DST corresponds to the first grade of hydrated oil. In order to obtain the same higher grade oil, the content of phosphatides should be reduced to 0,1%. The influence of the magnetic field on the water-dispersed medium was detected in the early 40's of the 20th century, and already in 1945 the Belgian engineer Vermayren had patented the first magnetic device to prevent the formation of scale and corrosion of the metal. After that, a wide industrial application of the magnetic method of "processing" water began in the whole world. And if initially the application of the magnetic method was limited to the influence on water - a carrier fluid containing dissolved substances forming on heat transfer surfaces of the calcane sedimentation, and subsequently the magnetic method has been used in various industries of the industry and even - in agriculture as a stimulant of plant growth. However, despite the widespread application of this method in practice, there is still no single theory that fully explains the mechanism of magnetic influence on water-dispersed media and solutions. To date, there are dozens of different theories that try to explain the mechanism of influence of the magnetic field on the environment that flows through it. We went by the introduction of magnetohydrodynamic resonators (MHD), also mastered and embodied in these devices the possibility of regulation in the processed medium, the adjustment parameters created by permanent magnets, which are based on the principle of the operation of the equipment. This fact allows us to successfully compensate for the inaccuracies of laboratory tests of chemical analysis of environments that are presented by enterprises - customers, and a large distribution of production loads (at pressures, temperatures, etc.) [1-3].

**The results of research.** Based on the well-known theories of magnetic field influence on water dispersion solutions, they created their theory of the perception of the process. Since water refers to solvents that have both oxidative and restorative properties, that is, amphiproterone, then its molecules interact with each other by reaction:

$$H_2O+H_2O \leftrightarrow H_3O^+ + OH^- \quad (1)$$

In this case, a hydrated proton is formed which is stable in water, but because H3O + has a positive charge, then apparently, while in the aquatic environment, it will interact with the Coulomb forces with the nearest portion having a negative charge (Fig. 1). In this case, the hydration of this particle (ion) will increase as the amount of water molecules that are bound to it increases.

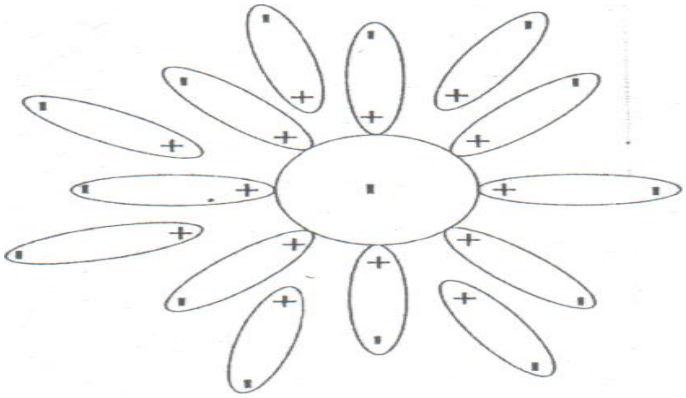

**Fig.1.** Process for the coagulation of phosphorus-containing particles.

It is known that the "magnetization" of a solution of oil - water (water) affects the hydration of ions (particles - phosphorus) in it. T. I the influence of the magnetic field increases the degree of conversion of chemical reactions (1) will proceed with a greater degree of transformation by the following mechanism: under the influence of the artificially created field, with some intensity exceeding the action of the magnetic field of the earth, on the water molecule (considered as dipoles). The latter begin to focus on the strength lines of the magnetic field. This increases the probability of interaction between dipoles and ions of opposite charges, and therefore leads to an increase in the degree of conversion of the reaction (1) and other chemical reactions occurring in the aqueous medium. As the intensity of the magnetic field increases, its effect on both free molecules of water and on bound ones (which provide the hydration of ions or particles) increases. As soon as the strength of the magnetic influence on the water molecules exceeds the forces causing hydration, the decrease of the hydrated shells of the particles (ions) will begin as the water molecules are oriented in relation to the magnetic field lines of power, then they will be separated from the particle (ion) (Fig. 2) . In this connection, the possibility of interaction of ions (particles) of opposite charges increases due to the reduction of the distance between them. An increase in the degree of conversion of chemical reactions is shown, based on the explanation of the increase in the degree of conversion of the reaction (1), that is, the mechanism is similar.

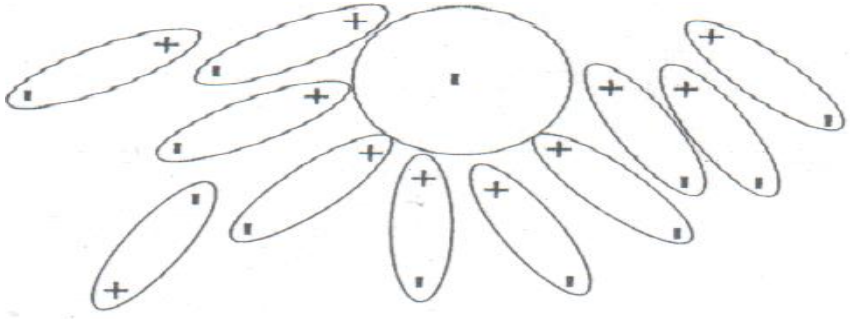

**Fig. 2.** Not symmetrical hydration.

Thus, knowing the forces that cause the hydration of the ions, one can determine the intensity of the artificially created magnetic field, which is necessary to change the hydration of the ions (particles) to the bigger or smaller side. Since the increase of hydration of ions in water under certain conditions will increase its density (in that the size of the hydrated particles increases due to additional water molecules) and, consequently, other physical properties. By reducing the hydration on the contrary, then, the magnetic field can affect many physical properties, the magnitude of which may change when the hydration of ions (particles) in the oil is changed. From Fig. 2 it is visible that the hydrated shell of a particle under the influence of a magnetic field becomes asymmetric, which is confirmed by many scientists. Asymmetry of the hydrated shell, many researchers explain the translational motion of the particle in the moving stream. As an example, let's look at the process of formation of scum deposits. The ions of $Ca^{2+}$ and $CO_3^{2-}$, which mainly form flammable deposits, are in water in the hydrated form, that is, they are connected with water molecules (to the positively charged $Ca^{2+}$ , $CO_3^{2-}$ the dipole

of water is attracted by the negative side, and to the negatively charged $CO_3^{2-}$ - the positive side) that cause hydration of the ion. As the temperature rises, an increase in the kinetic energy of the particles occurs, which ultimately increases the probability of the interaction of these ions, after which the salt of $CaCO_3$, is formed, which is the basis of the calcane deposition. Since the most intense convective heat transfer during leakage, the water heated (or cooled) in the tubes of heat exchange devices is near and on the very surface of the heat exchange, then, in principle, the above reaction will proceed there and, accordingly, the products of this reaction will adhere and remain on the heat transfer surface, respectively , that is, scum. The effect of the magnetic field on water is likely to reduce the hydration of ions in the volume of flow, but on the heat transfer surface, but above the mechanism described. Hydrated proton $H_3\ O^+$, obtained by dissociation of two water molecules, is a proton H + and a water dipole $H_2O$. Obviously, this hydrated proton can overcome the van der Waals adhesive forces at the boundary of "scale - heat exchange surface", which is likely to cause scale scaling.Thus, the magnetization of water solutions allows the formation of hardness layers not on the heat transfer surface, but in the volume of the mixture of oil - water, which are subsequently withdrawn from the flow with the help of a slurry collector, if necessary [2-4].

**Conclusions.** Due to the fact that the probability of formation of solid particles in the amount of oil solution - water (under the influence of the magnetic field) increases, then the load on the equipment, working on the basis of chemical reagents, is reduced. That is, the consumption of reagents for conducting reactions without loss of the product at the output or increasing its (product) concentration.

## REFERENCES

1. Nasretdinov E. S., Rahimov R. B., Komilov M. Z. Characteristics of the electromagnetic field. // Storage and processing of agricultural raw materials. 1998. №2, p.20-21.

2. Technology of production of vegetable oils. V.M. Kopeikovsky, S.I. Danilchuk, G. I. Garbuzov and others under the editorship. VM Kopeykovsky. - Moscow: Light and food industry, 1982. - 416 pp.

3. Topilin GE, Osadchuk P.I., Galtsev VP Effective method of obtaining live vegetable oil. // Agrarian Bulletin of the Black Sea Region: Collection of scientific works. No. 5 (19). - Odessa, 2002.

4. Osadchuk PI, Topilin G. E., Galtsev V. P. Hydration of vegetable oil, coagulation of phosphatides and wax printing // Agricultural Bulletin of the Black Sea, Technical Sciences - 2004 - No. 24 - P.28 - 32.

## ВНЕДРЕНИЕ МАГНИТНЫХ ГИДРОДИНАМИЧЕСКИХ РЕЗОНАТОРОВ ПРИ ОЧИСТКЕ РАСТИТЕЛЬНЫХ МАСЕЛ.

Осадчук П. И.

**Ключевые слова:** вода, раствор вода – масло, магнитное поле, гидратация, химическая реакция.

Резюме

*В статье проанализированы механизмы влияния магнитного поля на раствор масло-вода при процессе гидратации. Основываясь на известных*

*теориях влияния магнитного поля на воднодиспесные растворы, приводится свое видение теории протекания данного процесса.*

## INTRODUCTION OF MAGNETIC HYDRODYNAMIC RESONATORS WHEN CLEANING VEGETABLE OILS

Osadchyk P. I.

**Key words:** water, water solution - oil, magnetic field, hydration, chemical reaction.

Summary

*The article is analyzed by the mechanisms of the influence of the magnetic field on the oil-water solution during the hydration process. Based on the well-known theories of the influence of the magnetic field on water-soluble solutions, we give our own vision of the theory of the flow of this process.*