

ECOLOGICAL TREATMENT OF OIL SEWAGE BY MAGNETOFLUID METHODS AND ELECTROMAGNETIC FILTRATION OF THE TECHNOLOGICAL WASTE WATER AND GASES IN INDUSTRY

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Adding into purification substance magnetic fluid it is possible to magnetize oil film and oil products. The property of magnetic fluid to draw into the area of high magnetic field intensity permits to collect magnetized oil film and oil products.

The purpose of reports is to establish the theory, principles, feasibility, and potential applications of the new sewage treatment methods and techniques and to investigate their expected capabilities.

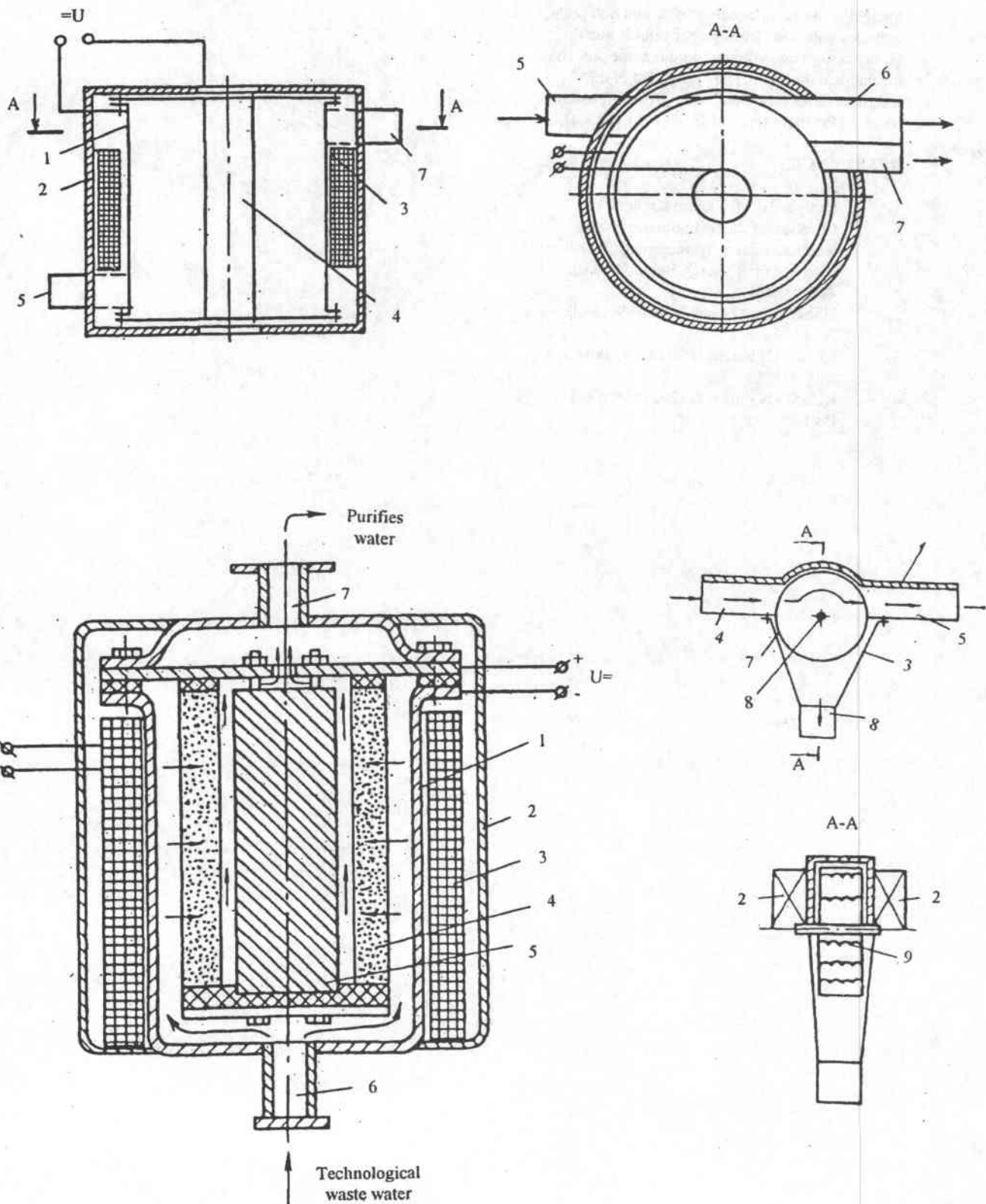
In the "Theoretical electrotechnics" chair of Azerbaijan State Oil Academy special electromagnetic devices for waster water treatment are constructed. One of these devices - magnetic fluid cluten collects oil film from the surface. Another device is need for volume water purification from oil products. Working channel of the wedge-shaped clearance along which non homogeneous magnetic field is applied. At the end of the channel there is a partition which separates oil and purified water. For the water purification from magnetied oil products the electromagnetic hydrocyclone is constructed. To increase forces affecting on oil products, this device is applied with both magnetic and electric fields. In experiments magnetic fluid clutch purified water from the oil film with the thickness $0,7 \cdot 10^{-3} \dots 0,8 \cdot 10^{-3}$ mend higher. By means of electromagnetic hidroclhone separation of oil products with the size $2 \cdot 10^{-5}$ m, and higher is possible. In experimental investigations headless electromagnetic hydrocyclone was found. This device purifies oil containing waster water in surface and volume. Also theoretical model of purification process in constructed devices is developed.

Filtration of gaseous industrial discharges is a matter of great ecological importance. In a number of cases it is preferable to realize such an operation with the use of magnetic fields. In this article the possibility of creating a circular rotating magnetic field by a system of endless magnetic poles placed along the surface of a cylinder has been analytically considered. The field is created in a processing zone of the devise outside the poles. Conditions for obtaining the circular hodog raph of a vector of intensity of

magnetic field has been formulated and the solution of differential field equations satisfying these conditions has been obtained. Using a concept of the complex potential of magnetic field and taking into account the obtained solution of field equations expression for magnetic equipotential surfaces has been obtained. Choosing an appropriate one of the formula describing a shape of pole shoes envisaging initial conditions has been developed. When the cylinder with such poles uniformly rotates or exciting coils of static magnetic poles are fed by relevant polyphase system of currents the vector of magnetic intensity at any point within the processing zone of the device is involved in a rotational movement but retains its length unchanged. A particle of magnetic material placed in such a field experiences an action of the magnetic force rotating it about its center of gravity and, thus, conducting to removal of particles from the gas flow. Actually of ecological problem in oil industry bringing out demands to develop new high quality scientifically based technological methods for cleaning, purification and retaining petroleum products and waster liquids. One of the perspective way to solve the problem is the application of magnetic liquids and electromagnetic filter and devices based on the above mentioned phenomena [1].

At the "Theoretical electrotechnic" department of the Azerbaijan State Oil Academy was developed theoretical background and different constructions of the electromagnetic filters and the protection systems has based on magnetic liquids for some petroleum products, technological liquids and gases. In these appliances magnetic liquids use to raise efficiency of the construction and in some of them as an additional absorber for removal petroleum and its products films from the waster liquids. The efficiency of the filtration process is depend on geometrical, electrical, magnetical and hydrodynamical parameters of the system and properties of liquids.

The report deals with theoretical aspects of the electromagnetical filtration and suggests real constructions of the equipment for processing



Constructions of the Electromagnetic filters for wide class of technological liquids and gases

magnetic and nonmagnetic, polar and non polar particles and films from waster liquids and for germetisation by magnetic liquids some parts of mechanical and electrical equipment of oil industry. Several Soviet Union (Russian) patents received for main types of filters (Fig.) [2,3,4].

REFERENCES

1. Kuliyeu H. M. Electromagnetic filtration of the technological waste water and gases. Monography, ELM (Science Publishers), Baku, 1998 (in Azerbaijan).
2. USSR Patent N 1692652, 1991, Bull. N 43.
3. RUSSIAN Patent N 2014149, 1994, Bull. N 11
4. RUSSIAN Patent N 2023476, 1994, Bull. N 22