

STATIONARY FLOWS OF LIQUID IN THE VICINITY OF THE SMALL FERROMAGNETIC PARTICLES IN CONSTANT HOMOGENEOUS MAGNETIC FIELD

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It was revealed [1, 2] that the stationary flows of salt and acid solutions occur in the vicinity of the fine-grained particles if the solutions are placed in the constant homogeneous exterior magnetic field. The steel needles and iron balls were used as the fine-grained particles [1-4]. The influence of value of the exterior magnetic field on the velocity of movement of the model liquid was defined [1, 2].

The paper is devoted of the experimental research of the stationary movement of salt, acid and alkali solutions in the vicinity of the fine-grained particles (orbs of various diameters and needles of different sizes) placed in the constant exterior magnetic field.

The experiments were carried out utilizing the installation described in [3]. The ferromagnetic particle (sizes of particles vary from 10 up to 1000 microns) were placed in the cuvette described in [1,2]. The cuvette was filled by the solution of salt, acid or alkali. The following solutions were made: 12% NaCl and KI solutions, diluted sulfuric H_2SO_4 , hydrochloric HCl, nitric HNO_3 acids (pH = 1-2), alkali NaOH (pH = 12,5) and others. The movement of solutions was observed in the cuvette after switching on the exterior homogeneous magnetic field (value of the magnetic field varies from 1000 up to 3000 Oe). The particles of black water paint were used as indicators of movement of liquid. The velocity of liquid approaches to the constant value within the first several minutes of experiment and does not change during more than 20 minutes of observation. The movement of the solution stopped after switching off the external magnetic field. The experiments have shown that the direction of movement of one dissolved substances is opposite to the direction of movement of other dissolved substances. Thus the direction of flows of the solutions in the vicinity of the ferromagnetic particles does not depend on the class of substance and the direction depends on concrete ions included in the solution. The movement of the solutions is investigated in the vicinity of the chains of ferromagnetic spheres. Various configurations of flows of solutions were obtained in the vicinity of the chains because of changing the properties of covering of ferromagnetic full-spheres included in the chain and because of changing their disposition.

Thus it is possible to form the predictable directions of flows of electrolytes in the vicinity of the fine grained particles placed in the external magnetic field for creation of new tools of clearing and separation of liquid media. This aim can be reached utilizing the set of packings with various coverings that consist of various initial components and taking into account the properties of media.

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