Full Paper _____ *Thematic Section:* Physicochemical Research.
Reference Object Identifier – ROI: jbc-01/17-52-10-146 *Subsection:* Physical Inorganic Chemistry.
The Digital Object Identifier – DOI: 10.37952/ROI-jbc-01/17-52-10-146
Submitted on October 18, 2017.

Specific conductivity and pH of solution NaCl–H_2SO_4–H_2O

© **Igor N. Tanutrov**,* **Simon O. Potapov**, and **Marina N. Sviridova**[+]
Institute of Metallurgy of Ural Branch of Russian Academy of Sciences. Amundsen St., 101. Ekaterinburg, 620016. Russia. Phone: +7 (904) 380-56-57. E-mail: intan38@live.ru

*Supervising author; [+]Corresponding author
Keywords: aqueous solution, sodium chloride, sulphuric acid, specific conductivity, pH.

Abstract

Studies of the electrical conductivity (κ) and pH made use of compensatory contact method using the AC bridge. Control of pH of solutions and temperature conducted by the device pH55. The solutions were changed in the interval, the aggregate (NaCl + H_2SO_4) concentration ΣM from 0.1 to 2.0 mol/L and varying inside the interval, the concentration of H_2SO_4 from 0 to 2 mol/L. is established that with increasing total concentration of the reagents increases the conductivity. The electrical conductivity values with the introduction of NaCl markedly lower than those for aqueous solution of H_2SO_4, indicating significant changes in the ionic composition of the solvent. Statistical analysis of experimental data showed that they are well described by quadratic equations of temperature dependence of conductivity the total concentration of reagents is most accurately represented in exponential form: $Ln\kappa_t = Ln\kappa_0 - E/RT$. A weak dependence of the activation energy of electrical conductivity from solution composition (7.095 kJ/mol) indicates the identity of the ions involved in the transfer charge in the solution in the studied compositions. Of changes in the valuesκ_0 in order to increase ΣM and the proportion of NaCl in the sum indicates the reduction of the share of the relay mechanism of charge transfer of the hydrogen ion in hydronium. Data on the dependence of the pH value from the composition of the solution also point to the decline in the percentage change valuesΣM in order to increase ΣM and the proportion of NaCl in the amount also indicated that decline.

References

[1] V.M. Andreev, A.S. Kuznetsov, G.I. Petrov, L.N. Sigina. Made in Germany. *Moscow: Metallurgy.* **1969**. 96p. (russian)
[2] V.F. Borbat, Yu.L. Mikhailov, L.N. Adeeva, O.A. Golovanova, T.N. Filatova. Investigation of the possibility of beneficiation of fly ash CHP in rare and nonferrous metals for further extraction. *Chemistry and chemical technology.* **1999**. Vol.42. Vol.5. P.86-90. (russian)
[3] O.S. Potapov, M.N. Sviridova, I.N. Tanutrov, and D.A. Toloknov. The physics-chemical properties of fly-ash from the burning of Ekibastuz coals. *Butlerov Communications.* **2016**. Vol.45. No.3. P.36-39. DOI: 10.37952/ROI-jbc-01/16-45-3-36
[4] O.S. Potapov, M.N. Sviridova, and I.N. Tanutrov. The behaviorof gallium and aluminum sulfuric acid during processing offly-ash from reftinskaya hydroelectric power plant. *Butlerov Communications.* **2016**. Vol.45. No.3. P.40-43. DOI: 10.37952/ROI-jbc-01/16-45-3-40
[5] I.N. Tanutrov, M.N. Sviridova. Thermodynamics of NaCl-H2SO4-H2O solutions. *Butlerov messages.* **2017.** Vol.51. No.7. P.25-30. (russian)
[6] A.A. Potapov. Electronic structure of water. *Butlerov Communications.* **2014.** Vol.37. No.3. P.134-148. ROI: jbc-02/14-37-3-134
[7] A.A. Lapin, and Yu.V. Chugunov. Effect of temperature on the antioxidant activity of water. *Butlerov Communications.* **2012.** Vol.30. No.6. P.113-119. ROI: jbc-02/12-30-6-113
[8] I.N. Tanutrov, S.O. Potapov, M.N. Sviridova. Density and surface tension of NaCl-H2SO4-H2O solutions. *Butlerov messages.* **2017**. Vol.51. No.7. P.91-94. (russian)
[9] Yu.S. Rybakov. Laboratory work on physical and colloidal chemistry. *Moscow: Higher school.* **1989.** 111p. (russian)
[10] Chemist's Handbook. Vol. 2. The basic properties of inorganic and organic compounds. *Leningrad.-Moscow: Chemistry.* **1964**. 1167p. (russian)
[11] Jaeger, E. Zalkind, A. Methods of measurement in electrochemistry B2 vols, translated from English. under the editorship of J.A. Chizmadzhev. *Moscow: Mir*. **1977**. 585p. (russian)

[12] G. Matys, O. A., Slesarenko Instruments and methods of investigation of electrochemical systems. *Minsk: BSTU*. **2011**. 164p.