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Interactive comment on "Ion's association in soil and vadose zone of Azov-Black sea region" *by* A. A. Batukaev et al.

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The article is devoted to the important issue of equilibria in water solution, which is necessary for a proper understanding of the evolution of soils, mass transfer in the unsaturated zone. The authors contributed to the interpretation of these processes in terms of the classical theory of electrolytes. The proposed model is a definite development of the theory of electrolytes for heterogeneous geosystems, the properties of which are very difficult to interpret. According to the article, there are comments: 1. In the theory of electrolytes, there is a concept of ion's activity. One of the adopted chemical symbols for ion's activity is γ. The authors in their models into the equation (19) introduced the activity coefficient, but represent it as γe. What is difference of γefrom the standard designation symbol γ, and whether there is some difference between the standard form and the form of the activity coefficient of the ion, the authors stated. This

is subject to eliminate. 2. In the physical model for extraction the soil solution, the authors used a substrate of soil and sand, which is considered an analog of the studied original soil. The presence of sand dramatically increases the hydraulic conductivity of an artificial system that distinguishes it from natural brown soil. In addition, simulating the humidity in an artificial system, the authors, in our opinion, made a mistake of generalization of characteristics of the object modeling. Yes, in complex of chestnut soil the moisture can be as high as the authors have shown in Table 1, however, this state of soil humidity is less common than the typical condition of low humidity. Soil moisture of solonetzic complex, especially in the summer, may be less than 10%, and for the sufficiently long period of time. Is the real soil moisture and aeration zone is consistent with the model and its interpretation, the authors proposed? The article is written at high scientific level and after minor revision can be published.

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