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Effect of electric potential and heating on surface of KCl

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The purpose of the work is research of morphology of structural changes of a surface {100} crystals KCl under action of heating and electric field potential enclosed to one of fasets of a crystal.

In experiments used samples with the sizes 20×8×2÷3 mm which was prepared from a large block. One side of a crystal contacted to an electrode. Reliability of contact was provided by a powder (10 microns) of a researched crystal which at heating and simultaneous compression conglomerated with a crystal and an electrode. The electrode did not exceed the sizes of the greater side of a crystal. The constant electric potential of 80 V (positive or negative) drove on an electrode. Experiences were carried out in a temperature interval of 293－023 K. Speed of heating was 200 K/h. After heating the electric field was disconnected, and the crystal cooled down to room temperature with speed of 50 K/h.

There were changes at temperatures more than 600K on all surfaces of samples. On negatively charged-as drops of jelly substance of the characteristic size of 3－50 microns and flat pyramidal stratifications with a drop or without one at top. On positive-drops of the smaller size and the flat stratifications. The quantity of amorphous phase on negatively charged surface is appreciablly higher, than on positively charged one.

Various mechanisms of accumulation of a charge corresponds to positive and negative polarities. In the first case, easily mobile ions of metal and an impurity drift to superficial areas of a crystal. The superficial potential interferes sublimation of the positive ions. The crystal lattice does not collapse, and superfluous ions of metal settle down in interstitial site. In the second case, accumulation of a negative charge is caused by outflow of ions of metal from the surfaces. There is a pauperization of this area of a crystal by positive ions and as consequence, destruction of a lattice by forces of coulomb repulsion, which can explain presence of much amorphous phase of changed stehiometry.

It is possible to explain the presence of morphological changes of surfaces in absence of a field by the various speed of evaporation a component of a matrix. The surface is enriched by ions of K because of the pressure of its vapour is higher than Cl one in the field of premelting temperatures.

Pyramidal stratifications are formed as a result of a relaxation of a volumetric charge with the subsequent restoration of stehiometric structure at cooling a sample.

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