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ON THE INFLUENCE ON ALKALINITY OF THE ATMOSPHERE IN WHICH NaCl CRYSTALS ARE GROWN

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The content of OH^- and CO^{2-} complexes in NaCl crystals has an important influence on their physical properties [1], [2]. Because it is suspected that these admixtures are formed during the growht of the crystals out of the melt in air, e.g. by hydrolysis of the molten salt [3], [4] under the influence of the humidity and CO_2 present in the air, the alkalinity of crystals grown both in air and in a flowing inert atmosphere of dry technical nitrogen and argon, respectively, was studied. At the same time it was also attempted to get a survey of the alkalinity of crystals grown in other laboratories and manufactured for technical purposes and of one natural crystal.

The alkalinity was measured by titration in an inert atmosphere using bromthymol blue as indicator. The determination was carried out in an inert atmosphere to exclude any influence of CO_2 from the air on the shade of the blue. The colour intensity was measured by means of a colorimeter. The sensitivity achieved in this way with 0·5 g of material was approx. $1 \cdot 10^{-4}$ mol %.

To check our results, A. Vaško of the Laboratory of Optics of the Czechoslovak Academy of Sciences, measured the infrared absorption spectrum of the „neutral" crystals. In the 400—5,000 cm^{-1} range no absorption lines of OH^- and CO^{2-}, respectively, could be observed, not even with a sample of 2 cm in thickness. (Details about the absorption caused by these complexes see [5]).

The alkalinity of 12 samples of „pure" crystals grown in air ranged from $2{\cdot}5 \cdot 10^{-3}$ to $1{\cdot}8 \cdot 10^{-2}$ mol %, whereas 10 samples of „pure" crystals grown in an inert atmosphere were neutral in 7 cases and slightly acidic in 3 cases. The commercial products and the natural crystal were found to be neutral throughout. So were crystals doped with 0·01 and 1 mol % of $CaCl_2$ and 0·01 mol % $ZnCl_2$, grown in an inert atmosphere.

A crystal doped with $Na_2HPO_4 \cdot 12\,H_2O$ grown in air was found to have on alkalinity of $2{\cdot}7 \cdot 10^{-3}$ mol %, a value not exceeding the range of alkalinity of „pure" crystals, grown in air and even the humidity of the raw material did not influence the alkalinity. On the other hand, a crystal grown in an atmos-

phere of air and water vapour exhibited an alkalinity of some $3{\cdot}0 \cdot 10^{-2}$ mol %; a considerably higher value than for crystals grown in air at the usual humidity.

It may therefore be concluded that in order to get „neutral" crystals (alkalinity $< 1 \cdot 10^{-4}$ mol %), it is sufficient to grow them in a protective dry atmosphere, regardless whether dealing with „pure" crystals or with crystals doped by some admixtures, whereas to increase the alkalinity to a more considerable extent, one has to secure an increase in the partial vapour pressure of the atmosphere.

In future attempts will be made to increase the sensitivity of the method used and then to investigate the influence of other admixtures on the alkalinity which cannot be completely excluded.

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ВЛИЯНИЕ АТМОСФЕРЫ НА ЩЕЛОЧНОСТЬ МОНОКРИСТАЛЛОВ NaCl ПРИ ИХ ВЫРАЩИВАНИИ

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Резюме

Была исследована щелочность различных кристаллов титрованием в инертной атмосфере. Показано, что кристаллы, выращенные в сухой инертной атмосфере, являются нейтральными (щелочность $< 1 \cdot 10^{-4}$ мол %) даже тогда, когда прибавляются примеси содержащие кристаллическую воду. Кристаллы, выращенные на воздухе, обнаруживают щелочность $< 1{,}8 \cdot 10^{-2}$ мол %, а кристаллы, выращенные в атмосфере с водяными парами — $< 3 \cdot 10^{-2}$ мол %.