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Influence of magnetic field on the growth mechanisms of sodium chlorate crystals

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The mechanisms of crystal growth depend on the temperature and supersaturation of the solution. As a result of their competition, different growth regimes may occur. The results of previous studies have shown that in the range of supersaturation of 0.66–1.56%, the {100} sodium chlorate crystal faces grow according to the model of spiral growth [1]. In order to determine the possible influence of the static magnetic field on the growth mechanisms of sodium chlorate crystals, two groups of experiments were performed in the supersaturation range of 0.89-1.56%. In the first group of experiments, crystals were nucleated and grown under zero-field conditions in a specific supersaturation range. In the second group of experiments, crystal growth was performed in the same supersaturation range, but at an applied magnetic field of 55±3 mT. The most common method for analyzing crystal growth mechanisms is to analyze the (R,σ) dependence, where R is the growth rate in <100> and σ is the supersaturation of the solution. Preliminary results of the analysis of this dependence for crystals grown under zero-field conditions show that the observed sodium chlorate crystals grew according to the Chernov's model of growth, i.e., growth by screw dislocations, while the crystals grew in the magnetic field according to the power law R~σ^n. The obtained results will be discussed in accordance with the theories of crystal growth.

References

1. Radiša, B. Z., Mitrović M. M., Misailović B. M., & Žekić A. A. (2016). Investigation of growth mechanisms of sodium chlorate crystals from aqueous solutions. Industrial & Engineering Chemistry Research, 55(39), 10436-10444.

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