Dendritic Crystallization of Salts

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Crystallization is a scientific process which has often been examined. Due to the number of parameters involved, questions still remain. This is especially true for dendritic crystallization. Therefore this project deals with comprehensive research regarding the dendritic crystal growth of salts. On this account I firstly worked with salt solutions and examined how parameters like concentration, saturation, temperature or pressure influenced the crystallization process and the morphology of the crystals. Dendritic crystallization is not a substance property, but only occurs under certain parameters. Experiment 1 showed that Ammonium Chloride, Ammonium Bromide and Potassium Nitrate crystallized in a dendritical way under the certain parameters with which I worked, while Sodium Chloride, Copper(II) Sulfate, Iron Sulfate and Magnesium Sulfate crystallized non-dendritically. Secondly I checked the effects of combining a dendritically-crystallizing salt with a nondendritically-crystallizing salt on the crystallization process. I focused on the heterogenous nucleation and found that Sodium Chloride can act as a crystal nucleus for Ammonium Chloride and Ammonium Bromide.I also examined the atomic structure of the crystallizing salts. I conducted an X-ray diffraction analysis for the examination of the atomic structure, while using an optical microscope for my other experiments. The X-ray analysis showed that a solid solution has been formed despite the high difference of the ionic radii of the substituting ions. By adapting my experiments I was able to develop a science kit prototype for children to spark their interest and explain dendritic crystal growth, while showing fast results. The fast crystal growth leads to short experiments and therefore to a better understanding o