



## **Investigation of influence of NaOH and NaCl activating solutions on bentonite stabilization in suspension fertilizers**

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### **1. INTRODUCTION**

Regular plants growth and their metabolic activity are determined by the macro- (C, H, O, N, P, S, K, Ca, Mg) and micronutrients (Fe, Mn, Zn, Cu, B, Mo, Cl, Ni). The role of these elements is very important, the excess as well as the deficiency have the negative influence on their development [1]. In order to increase yields and quality of crops a mineral, organic and mineral-organic fertilizers are applied. In the last years suspension fertilizers have been of great significance, taking the agricultural benefits into consideration. Suspension fertilizers are products of a new generation on account of higher nutrients concentrations than in the majority of other fertilizers, what makes them more efficient.

Suspension fertilizers differ from solid fertilizers in more regular distribution on field. Nutrients are more concentrated what is economically relevant on account of the facilitated transportation. Examinations indicated, that nutrients from suspension fertilizers are more available than from solid fertilizers. The high concentration of nutrients in fertilizer is obtained by introducing a substance which holds them regularly in the suspension. Bentonites are the substances used for stabilization of suspension fertilizers most often [2,3].

Bentonites belong to ore of clay minerals, primarily made from minerals of smectite group, montmorillonite especially [4]. Bentonite loams were formulated as a result of Aluminium Silicate-bearing Rocks weathering and subsequent sedimentation in the aqueous environment. Characteristic features of rocks of the smectite group are their ability to absorb water (swelling), to form thixotropic suspensions which aren't undergoing sedimentation process for a long time; as well as susceptibility to absorb cations and organic substances [4,5]. Therefore investigations have been carried out in order to evaluate the possibility of application of diverse loamy raw materials as suspension stabilizers for fertilizer purposes. In this paper research aimed at activating Jaroszków bentonite were presented.

### **2. MATERIALS AND METHODS**

The studies on activating clay minerals were carried out using the exchange of  $\text{Ca}^{2+}$ ,  $\text{K}^{+}$ ,  $\text{Mg}^{2+}$  ions to  $\text{Na}^{+}$  ions. For activation process the NaOH and NaCl solutions of concentrations 0,1M and 2,0M respectively were applied. For the purposes mentioned above 5g of weighed portion of mineral were introduced into four 250 ml conical flasks, two of them were filled with 100 ml of 0,1M and 2.0 M NaOH solution. Two remaining flasks were filled with 100 ml of 0,1M and 2.0 M NaCl solution. The samples prepared according to this instructions were shaken for 1 and 8 hours, and subsequently subjected to a vacuum filtration in order to separate solid fraction from filtrate. Mineral which remained on the filter was dried in temperature of 110°C for 2 hours. 1g of dried mineral was collected for further examinations, mixed with 100 ml of distilled water and poured into the 25 ml measuring cylinder. Then every day for 14 days a change of the volume of deposit, suspension and pure solution above the suspension have been measured.

### **3. RESULTS DISCUSSION**

"Jaroszków" bentonite, activated with  $\text{Na}^{+}$  ions using 0,1M NaOH solution constitutes the most beneficial agent stabilizing the solid phase in the aqueous environment. The time factor didn't have considerable influence

on bentonite activation. Results were similar for 1h as well as 8h. The addition of NaOH sustained suspension on respectively high level, about 80% vol., after 14 measurement days.