

## **Summary doctoral dissertation on the subject of “The research on influence of physicochemical properties of wet phosphoric acid on the process of acquiring phosphoric salts”**

Phosphates of ammonium are currently the most widespread phosphoric-nitric fertilizers. Fertilizers manufactured in GA „Police” SA distinguish themselves from the domestic competition by the high quality both in the chemical composition and the physical form. The quality of the raw materials, directed to production of fertilizers, undoubtedly influences both parameters.

The aim of this work was the development of a simple model supporting the control of the entrance streams to, with available at GA „Police” SA raw materials, to optimally conduct the process of phosphoric acid(V) production and fertilizers and maintain the highest quality of the product obtained.

In the first part of this work, in the laboratory conditions, the influence of contamination present in the wet phosphoric acid on the physicochemical characteristics of the obtained dihydrogenphosphate(V) of ammonium were determined. In this research the contaminations were inserted into wet phosphoric acid gradually increasing their content in the system.

Another stage of the work was determining the level of movement of some metals (iron, aluminium, magnesium, cadmium, chromium and nickel) and phosphates(V) from phosphate raw materials and waste sulphuric acid into particular streams of materials created during the production of the wet phosphoric acid and fertilizers. The research was conducted at the industrial scale, on the production installations of phosphoric acid(V) and fertilizers of GA „Police” SA.

The third stage of the work was related to the industrial installation for the manufacture of MAP. It consisted of determination the influence of contaminations in the extract phosphoric acid on the quality of the produced dihydrogenphosphate(V) of

ammonium and the stability of production of the installation of fertilizers. The minimum limit of contamination content was determined in the wet phosphoric acid, at which the technological problems within Tubular Reactor and Spray Tower of MAP occurred. The phase composition of the bonds created during ammonization of wet phosphate acid of the increased content of the particular contaminations was examined and the optimal conditions of conducting the process were determined. (i.e. the composition of the blends of different type of raw materials, the amount of dosed waste sulphuric acid) to obtain NP fertilizer of the required physicochemical properties and the appropriate work of the installation.

It has been concluded that in the researched production processes it would be crucial to possess the tool which would enable the management of the entrance streams in the process of phosphoric acid(V) and fertilizer production to control the movement of contamination. Controlling of the process with the special emphasis on contamination inserted into the system would enable the process to be more stable while at the same time to obtain the fertilizer of the required content of the nutrients, of the required phase composition and physical characteristics.

A simple model which uses gathered during the research on this work knowledge has been created and its usage in the extract phosphoric acid installations has been proposed to GA „Police” SA.

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