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Investigation of formation of granules at granulation of powdered materials in drum devices

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Statement of the Problem: Granulation of powdered materials in the presence of binding agent is widely used in the most multi-tonnage productions of chemical, food, pharmaceutical, metallurgical and agrarian technology. Granulation of powdered materials with participation of liquid phase is carried out in screw, disk, plate-shaped and drum devices and in devices with mixers. Available technology the main problem is that output of marketable fraction at granulation powdery materials in drum machines is not high enough. Therefore, the search for new methods of increasing the yield of marketable fractions and improve the physical-chemical and mechanical properties of the resulting product is relevant.

Methodology & Theoretical Orientation: On this basis, the influence of mixture of manganese ($MnSO_4$) and aluminum [$Al_2(SO_4)_3$] sulfate with ammonium hydroxide (NH_4OH) on composition and physical-chemical properties of the granulated superphosphate has been investigated under laboratory conditions. To the drum apparatus for moistening of powdered superphosphate by means of the nozzles located in several points longwise, the binding agent with composition: $MnSO_4$ – 18-20%, NH_4OH– 6-8%, $Al_2(SO_4)_3$– 4-5%, water –67-72% was given.

Conslusion & Significance: The process of granules formation has a wave and on measure of its growth – damped character. It is obvious that a wave character is determined by alternation of processes of lamination and size growth and decrease of size because of their consolidation. Powder lamination on granule surface is as consequence of its consolidation whereas a result of consolidation and compression, a binding agent containing in pores squeezed out to a surface, which increases a possibility and probability of further sticking of dry particles of powder. In all cases the further growth and completeness of form of granule is determined by distribution of concentration of binding agent in volume of granule, i.e. moisture content or moisture of granule surface.

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