

SYNTHESIS, PROPERTIES AND APPLICATION OF IRON OXIDES MAGNETIC NANOPARTICLES AND COMPOSITES ON THEIR BASIS

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In recent years, the possibility of using iron oxides magnetic nanoparticles and composites based on them as biologically active additives in agricultural technologies has been actively studied. However, the question of the relationship between the properties of iron oxides nanoparticles and their influence on the growth characteristics of plants still remains underexplored.

The purpose of this work is to synthesize and study the properties of γ -Fe₂O₃ and Fe₃O₄ nanoparticles synthesized by various methods, as well as Fe_xO_y@SiO₂ based sol-gel composites to evaluate the prospective of their use as biologically active additives in the agricultural technologies.

Magnetite nanoparticles were obtained by the precipitation method from solutions. Conditions of liquid-phase synthesis, such as synthesis temperature, concentration of initial salt solutions, methods of homogenizing components were varied. Maghemite nanoparticles were obtained both by direct precipitation from solutions and by oxidation of magnetite nanoparticles. Nanoparticles with the core-shell structure Fe₃O₄@ γ -Fe₂O₃ were also obtained on the basis of magnetite. The physicochemical and magnetic properties of the synthesized nanoparticles were studied.

Sol-gel compositions with different concentrations of iron oxide nanoparticles based on silica sol and nanoparticles were obtained. Barley seeds were then treated with these compositions.

The structure and properties of iron oxides magnetic nanoparticles and sol-gel compositions based on them, as well as their influence on the growth characteristics of barley seeds will be considered.

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