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# Preparation of Metallic Nanoparticles with the Use of Reagents of Natural Origin

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**Abstract :** Nowadays, nano-size materials are very popular group of materials among scientists. What is more, these materials find an application in a wide range of various areas. Therefore constantly increasing demand for nanomaterials including metallic nanoparticles such as silver of gold ones is observed. Therefore, new routes of their preparation are sought. Considering potential application of nanoparticles, it is important to select an adequate methodology of their preparation because it determines their size and shape. Among the most commonly applied methods of preparation of nanoparticles chemical and electrochemical techniques are leading. However, currently growing attention is directed into the biological or biochemical aspects of syntheses of metallic nanoparticles. This is associated with a trend of developing of new routes of preparation of given compounds according to the principles of green chemistry. These principles involve e.g. the reduction of the use of toxic compounds in the synthesis as well as the reduction of the energy demand or minimization of the generated waste. As a result, a growing popularity of the use of such components as natural plant extracts, infusions or essential oils is observed. Such natural substances may be used both as a reducing agent of metal ions and as a stabilizing agent of formed nanoparticles therefore they can replace synthetic compounds previously used for the reduction of metal ions or for the stabilization of obtained nanoparticles suspension. Methods that proceed in the presence of previously mentioned natural compounds are environmentally friendly and proceed without the application of any toxic reagents. Methodology: Presented research involves preparation of silver nanoparticles using selected plant extracts, e.g. artichoke extract. Extracts of natural origin were used as reducing and stabilizing agents at the same time. Furthermore, syntheses were carried out in the presence of additional polymeric stabilizing agent. Next, such features of obtained suspensions of nanoparticles as total antioxidant activity as well as content of phenolic compounds have been characterized. First of the mentioned studies involved the reaction with DPPH (2,2-Diphenyl-1-picrylhydrazyl) radical. The content of phenolic compounds was determined using Folin-Ciocalteu technique. Furthermore, an essential issue was also the determining of the stability of formed suspensions of nanoparticles. Conclusions: In the research it was demonstrated that metallic nanoparticles may be obtained using plant extracts or infusions as stabilizing or reducing agent. The methodology applied, i.e. a type of plant extract used during the synthesis, had an impact on the content of phenolic compounds as well as on the size and polydispersity of obtained nanoparticles. What is more, it is possible to prepare nano-size particles that will be characterized by properties desirable from the viewpoint of their potential application and such an effect may be achieved with the use of non-toxic reagents of natural origin. Furthermore, proposed methodology stays in line with the principles of green chemistry.

**Keywords :** green chemistry principles, metallic nanoparticles, plant extracts, stabilization of nanoparticles
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