

Nanochemistry and biotechnology

Green synthesis of silver and gold nanoparticles by using of polyphenolic compounds from Blackcurrant and Elderberry

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Biomolecules present in berries extracts can be used to reduce metal ions to nanoparticles in a single-step green synthesis process. This reduction is quite rapid, readily conducted at room temperature and pressure, and easily scaled up. However, the role of various water soluble plant metabolites (e.g. alkaloids, phenolic compounds, terpenoids) and co-enzymes is still not understood completely. A green synthesis method for the production of silver and gold nanoparticles using different extracts from blackcurrant and elderberry is reported in the present investigation. The extraction from blackcurrant and elderberry fruits were carried out by using 70% (v/v) ethanol-water solution acidified with 0.1% acetic acid. Then, extract was purified by silica gel 100 C₁₈ adsorbent to remove water solvable compounds (organic acids, dyes etc.) to have almost pure phenolic compounds. Contents of phenolics were measured by UV-Visible spectroscopy and LCMS. Silver and gold nanoparticles were synthesized in aqueous environment by reacting with AgNO₃ and HAuCl₄ with blackcurrant and elderberry extracts. The syntheses of silver and gold nanoparticles were characterized using UV-Visible spectrophotometry, X-ray diffraction, and FTIR spectroscopy. We have observed that phenolic compounds rich extracts have too strong reducing properties in acidic and neutral solutions what leads to formation of large size particles of silver and gold. However, metal nanoparticles can be successfully synthesized in aqueous solutions after optimization of reagents ratios and pH.

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