

## **GOLD NANOPARTICLE FORMATION BY OAT AND WHEAT BIOMASSES**

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### **Abstract**

Oat and wheat biomasses have been shown to successfully bind AU(III) from aqueous solutions, but recent work shows that in addition to binding, these biomasses reduce AU(III) to Au(O) and form gold nanoparticles. Gold nanoparticles are now widely used in the industry for their application in electronics, in the medical field, and as catalysts. Bioreduction of Au by oat and wheat biomasses could be an alternative method for the physical methods used nowadays for the production of gold nanoparticles. We performed pH-dependency studies with oat and wheat biomasses in order to determine the effect of pH in the gold nanoparticles formation, and the different sizes and shapes of the nanoparticles formed at different pHs. In addition, capacity experiments were performed in order to determine the amount of AU(III) that can be taken up and reduced by the oat and wheat biomasses. Also, oat and wheat biomasses were chemically modified in order to determine the effect of the carboxyl groups in the Au nanoparticles formation. Batch experiments of pH profile and capacity were performed using esterified oat and wheat biomasses. In addition, CA(II) and MG(II) were studied for their interferences in the binding of AU(III) to the biomasses. Bi-metallic solutions of Au(III)/Fe(II), Au(III)/Cu(II), Au(III)/Pt(II), and Au(III)/Pd(II) were reacted with the biomasses for the possible formation of bimetallic nanoparticles.

**Key words:** oat, wheat, au nanoparticles, bimetallic nanoparticles