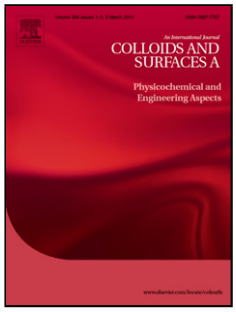

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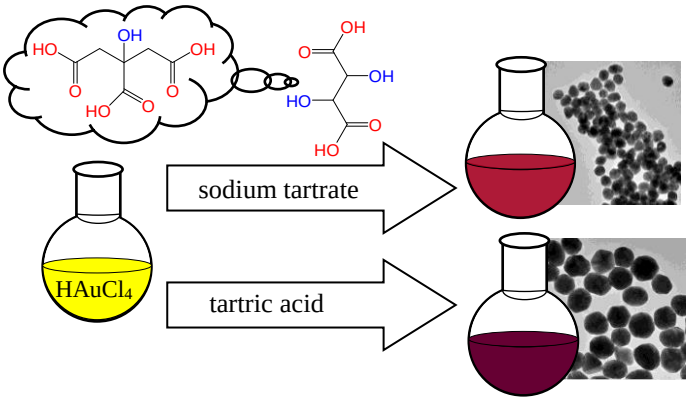
Tartrate as a substitute of citrate to prepare gold colloids from chloroauric acid

Na Liu, Ke Wang, Yuanyuan Gao, Dongxiang Li*, Weihong Lin, Chunfang Li

State Key Laboratory Base of Eco-chemical Engineering, Lab of Colloids and Functional Nanostructures, College of Chemistry and Molecular Engineering, Qingdao University of Science and Technology, Qingdao 266042, China. E-mail: lidx@iccas.ac.cn (D.X. Li).*

Graphical abstract



Tartrate, a similar molecule to citrate, was demonstrated to be able to prepare gold colloids from chloroauric acid. The gold nanoparticle size was adjusted from 27 to 40 nm when sodium tartrate was used as a reductant and stabilizer under different molar ratio of two reactants, while that only changed from 54 to 62 nm as using tartaric acid.

ABSTRACT

The citrate-reduction method is extensively used to prepare gold colloids particularly in the application of biological and medical areas. Tartrate as a substitute of citrate was first employed to prepare gold colloids from chloroauric acid due to its similar chemical structures to citrate. The size of obtained monodisperse quasi-spherical gold nanoparticles was adjusted from 27 nm to 40 nm when changing the molar ratio of sodium tartrate to chloroauric acid, while the particle size only changed from 54 to 62 nm under different molar ratio of tartaric acid to aurate. The nanoparticle size was mainly determined by the pH of reaction media in nucleation and the stabilizer concentration in the coagulation of initial nuclei for the nanoparticle growth. The majority of obtained gold nanoparticles have polycrystalline structure. This method should be important for direct one-pot preparation of gold colloids with sizes of around 30-60 nm.

Keywords:
Gold colloids
Chloroauric acid

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Gold nanoparticles have attracted increasing attention due to their unique properties in multidisciplinary research fields [1-5]. Particularly, scaled-up amount of gold colloids, defined by tiny-size and sphere, are likely required in many commercial and industrial applications such as medicine, cosmetics, photovoltaics, catalysis, fuel cells, sensors and analysis [4-6]. The citrate-reduction method [7], first published in 1951 and also called Turkevich method, is extensively used to prepare gold colloids particularly in the biological and medical areas [8-10]. In this method, rapid adding sodium citrate into boiling aqueous solution of