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METHOD OF CO-PRECIPITATION FOR THE SYNTHESIS OF SILVER NANOPARTICLES

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ABSTRACT

Co-precipitation was used to create silver (Ag) nanoparticles with a diameter of less than 20 nm. The reaction was carried out using NaBH4 as a reduction reagent. By changing the colour of the solution, we were able to validate the reduction process. By employing transmission electron microscopy, we were able to validate the nanoparticles' size and particle dispersion. With the use of a reduction reagent, the procedure is simple and the size may be precisely controlled. Co-precipitated silver nanoparticles were synthesised using transmission electron microscopy (TEM).

INTRODUCTION

The term "nanoparticle" refers to a particle whose diameter is less than one nanometer. Since of their distinct chemical and physical characteristics, nanoparticles are of interest to researchers because they are different from bulk materials[1]. Because of their small size and large surface area, the properties change. The characteristics of metallic nanoparticles alter as they become smaller, which has led to a wide range of applications in the fields of chemistry, medicine, and quantum confinement systems. Chemical and physical methods may be used to synthesise these metallic nanoparticles, including solvothermal synthesis, electrochemical synthesis, and microwave dielectric heating reduction. (6) and (7)
Silver (Ag) and gold (Au) have recently been shown to be effective cancer therapy metals. According to recent research [8],Anticancer activity against three human cancer cell lines U2OS osteosarcoma, MB231 breast cancer, and SW480 colon carcinoma may be developed and employed using PEGylated amino pyrimidines on gold and silver nanoparticle surfaces. Silver and gold nanoparticles have also been shown to target PEGylation in cancer cells and have a significant impact on inducing apoptosis in those cells. 8 and 9

The preparation and characterisation of silver nanoparticles utilising the co-precipitation technique will be the focus of this presentation. Transmission electron microscopy (TEM) was used to examine the specimens and determine their characteristics.

I. SAMPLE PREPARATION

Silver nitrate (AgNO3), triply distilled water (H2O), 1% tri-sodium citrate, and NaBH4 were utilised in this study. Before usage, all solvents and compounds were distilled to ensure they were of synthesis quality. Co-precipitation was used to reduce silver nitrate to silver nanoparticles. There are reducing agents in this procedure, such as 1 per cent tri-sodium citrate and NaBH4. A 90-mg AgNO3 solution in 500mL of triply distilled H2O was heated rapidly to boiling in a 1L flask. Ten illilitres of sodium citrate solution, 1%, was added to this solution. After 30 minutes of boiling, the reaction mixture was diluted to 420mL. Colour changes were seen in a series of reduction processes. Centrifuging the reaction mixture twice for 10 minutes at 10,000 rpm concentrated the AgNPs, which were then collected. All nanoparticles were maintained at room temperature in dark bottles and were normally utilised within a few months after being prepared. The characterization of several reduction reactionsthe solution's colour changes may be seen. All nanoparticles were maintained at room temperature in dark bottles and were normally utilised within a few months after being prepared.

II. RESULT AND DISCUSSION

Reduction processes marked by colour changes are illustrated in the articles [10-12]. As the reaction continued, the solution's colour changed from translucent liquid to a yellowish hue in our sample preparations. A colloidal solution of atlass was prepared, and the nanoparticles were then centrifuged at 10000 rpm and kept in dark vials.
We may infer that the reaction was carried out effectively and that the intended product was created based on the colour change seen in the reaction.

(a) (b) (c)

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Figure 1 The reduction reaction was shown in the illustration by the shift in colour sequence. (a) The combination is initially clear. (b) When the liquid was boiling, it became a light yellow tint. (b) c) The colloidal solution was visible after the process.

Transmission is used as a primary tool to determine the physical characteristics and the size of the nanoparticles. The samples were scanned at various scan sizes from 20 nm – to 200 nm as shown in Figure 2.
From the images, it can be concluded that particles are formed with a fairly even size. Hence the distribution is fairly even size distribution. Many particles fell within ~ 20nm. Some silver nanoparticles aggregated and formed a comparative bigger size particle as shown in Figure 2 (c). It is observed that the normal size nanoparticles were coagulating around the large particle in a circular order.

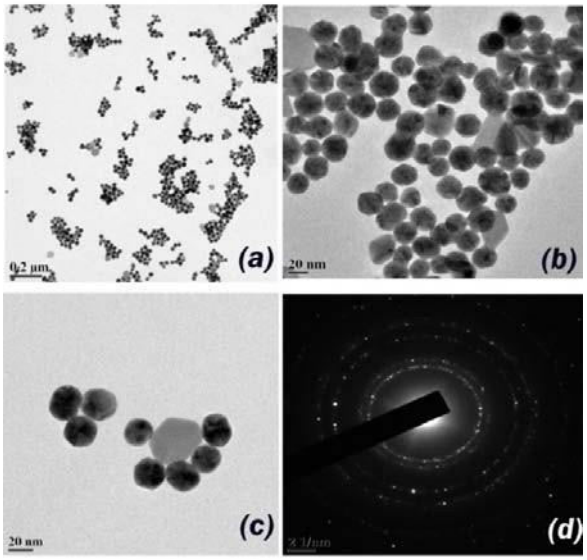

Figure 2 Silver nanoparticle high-resolution TEM scan pictures. (a) Ag nanoparticles were scanned at 0.2 nm. By scanning the nanoparticles at 20nm resolution, we can see that the dispersion is practically identical. C) Scanned Ag nanoparticles at a size of 20 nm to demonstrate the aggregation process.

In light of the findings, it can be said that the co-precipitation approach and NaBH4 as a reduction agent were both effective in producing Ag nanoparticles.

III. CONCLUSION

silver may be generated through co-precipitation, according to the findings of this study. Co-precipitation was employed to make the Ag nanoparticles, according to the results. Each particle was smaller than 20 nanometers across and was equally distributed. In contrast, a more uniform particle agglomeration is achieved at greater agitation temperatures and stirring rates.

[1] M. Mazur, Electrochemistry Communications 6 (2004) 400-403.
[2] D.T. Thompson, Nano Today 2 (2007)40-43.
[3] M.-C. Daniel, D. Astruc, Chemicalreviews 104 (2004) 293-346.
[4] X. Huang, P.K. Jain, I.H. El-Sayed,M.A. El-Sayed, (2007).
[5] K. Jayanthi, S. Chawla, H. Chander, D.Haranath, Crystal Research and Technology 42(2007) 976-982.
[6] V. Mohanraj, Y. Chen, Tropical Journal of Pharmaceutical Research 5 (2006) 561-573.
[7] M. Brust, C.J. Kiely, Colloids and Surfaces A: Physicochemical and Engineering Aspects 202 (2002) 175-186.
[8] N.K.L. Rahatgaonkar, A. M., Journal of Chemical and Pharmaceutical Research 8 (2016) 669-685.
[9] M.S. Chorghae, A.M. Rahatgaonkar,K.R. Lanjewar, B.D. Saraf, Synthesis andbiological evaluation of 3, 5-disubstituted isoxazolines as potential antitumor agents,AMER CHEMICAL SOC 1155 16TH ST, NW,WASHINGTON, DC 20036 USA, 2010.
[10] R.S. Chorghade, M.K. Gaidhane, A.M.Rahatgaonkar, M.S. Chorghade, Facile polymersupported synthesis of N-PEGylated quinolinescaffolds, AMER CHEMICAL SOC 115516TH ST, NW, WASHINGTON, DC 20036USA, 2014.[11] S.T. Dubas, V. Pimpan, Talanta 76(2008) 29-33.
[12] D. Philip, Spectrochimica Acta Part A:Molecular and Biomolecular Spectroscopy 71(2008) 80-85.