International Journal of Chemical Studies

P-ISSN2349–8528
E-ISSN 2321–4902
IJCS 2016; 4(1): 64-65

Received: 15-11-2015
Accepted: 16-12-2015

Dr. Ashok Kumar Acharya
PG Department of Chemistry
Ranchi College, Ranchi,
Jharkhand, India

Correspondence
Dr. Ashok Kumar Acharya
PG Department of Chemistry
Ranchi College, Ranchi,
Jharkhand, India

Green Synthesis and characterisation of some gold nanoparticles using reducing agent obtained from fruit extract

Dr. Ashok Kumar Acharya

Abstract
Synthesis of gold nanoparticles from $NaAuCl_4.2H_2o$ by using fruit extract as capping and reducing agent. The condition of formation was established by various reaction parameters, such as pH, Temperature, and concentration of extract and their effect on morphology was studied. The formation was confirmed by colour change and by UV-Vis Spectra. Au NP was efficiently synthesized at pH 5-concentration $1.0x10^{-1}M$, $1.0x10^{-2}M$, $1.5x10^{-2}M$ $NaAuCl_4.2H_2o$ and reaction was maintained at room temperature. TEM, X-RD analysis can confirm the formation of metallic Au NPs having an average size of 20-32nm, respectively.

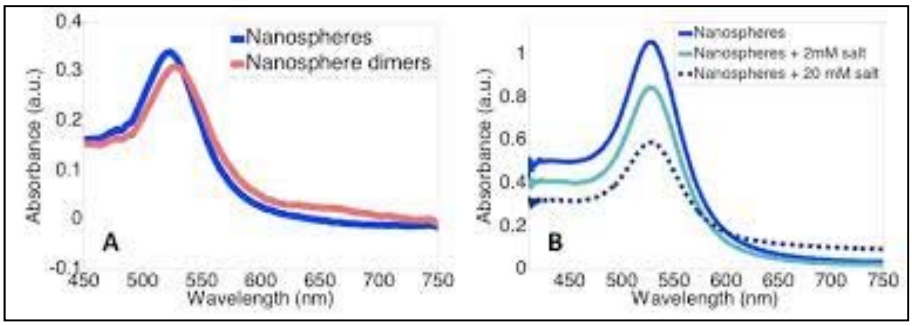
Keywords: Synthesis of Au NPS by using fruit extract

1. Introduction
The synthesis of bio adaptable eco-friendly nanoparticles is an interesting area of nanoscience. It is of very low cost, nontoxic method which has tremendous potential in biomedical field. Earlier in the synthesis of Au NPs reducing by metallic agents, a large number of reducing agents were reported[-2] in the literature. These are toxic method employ toxic chemicals in the synthesis route which may have side effect in the medical application. In the present study or investigation, green synthesis approach has advantages over physical and chemical approaches as it is eco-friendly, cost effective and toxic chemicals are not required in the synthesis protocol. Green chemistry can play a prominent role in guiding the development of nanotechnology to provide the maximum benefit of these products for society and the environment.
The use of phytochemicals in the synthesis of nanoparticles is an important symbiosis between nanotechnology and green chemistry. Because of high vitamin C content it shows antibacterial and astringent properties, used in herbal medicine to build immunity against colds, influenza and other viral infections. In the present study gold nano particles have been synthesised by the orange extract. The nano particles have been characterised by UV-Visible and TEM studies.

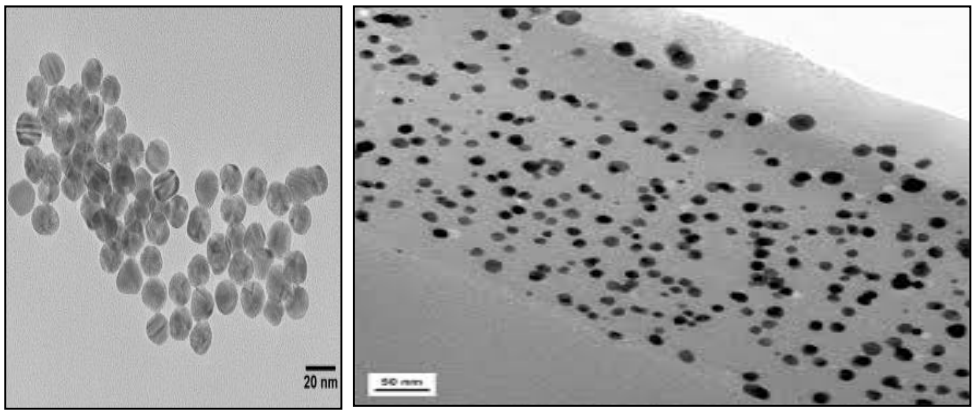
1.1 Experimental: Sodium tetrachloroaurate ($NaAuCl_4$) used in the present study was highest purity. Deionised water was used throughout the reactions. All glass wares were washed with dilute HNO_3 and distilled water. Then dried it in hot air oven. A stock solution of $NaAuCl_4$ of different concentrations $1.0x10^{-1}M$, $1.0x10^{-2}M$, $1.5x10^{-2}M$ were prepared in 100ml distilled water. 100 gm orange was added to 6ml distilled water stirred continuously at room temperature for 15 minutes. The contained was filtered to replace the fiber and collected in an Erlenmeyer flask. The fruit extract was centrifuged 8000rpm for 30 minutes and stock in dark around 10-15^0C which can be used as reducing and capping agent within a week.

1.2 Synthesis of AuNPs
To synthesise AuNP, 10ml of aqueous orange extract was added to 90ml $1.0x10^{-1}M$ $NaAuCl_4$ solution in 500ml Erlenmeyer flask and stirred for 2hr at 1200rpm at 40^0c. Three different concentrations $NaAuCl_4$ were taken in three different flasks along with orange extract and fixed these in a rotatory shaker for 2 hours. The colour of the mixture slowly turned light violet from white indicates the formation of gold nanoparticles. The reaction mixture was stirred for an additional 15 minutes and gold nanoparticles thus formed were separated from orange juice. The gold nanoparticles exhibit different colours intense red, magenta etc. depending on the particle size.

2. Result and discussion: Gold nanoparticles were characterised by UV-Vis spectroscopy. The green process for the production of gold nanoparticles uses direct interaction of sodium tetrachloroaurate ($NaAuCl_4$) with orange extract in the absence of manmade chemicals. Various photochemical present in orange is presumable responsible for making robust coating on gold nanoparticles and thus, rendering stability against agglomerations. Absorption orange-AuNP 532nm-540nm.



As the concentration of fruit extract increases, the absorption peak gets more sharpness. This was more confirmed by TEM images the size orange-AuNP is in the range 20-32nm respectively.



The intensity of the SPR peak increased as the reaction time increased, which indicated the increased in concentration of AuNP. After 5-6 days absorbance slightly decreased. From the study it was found that the time span required for reduction of Au^{+3} ranged from 1-2 days. X-RD pattern clear that AuNP formed using orange extract were crystalline. The average nanocrystalline size has been estimated by using Debye-Scherrer formula $D=K\lambda/\beta Cos\ \theta$. By Debye-Scherrer equation average particle size calculated to 20-32nm which approximately matched with TEM image AgNP.

2.1 Variation with temperature and pH: From the above UV-Visible spectra data at different temperature led to a rapid reduction rate of Au^{+3} to AuNP with smaller size. Absorbance increases with increase of pH 6-8 Then decreases. A major major influence of the reaction pH is its ability to change the electrical charges of bio molecules which might affect their capping and stabilizing abilities and subsequently growth of the nanoparticles. Result was confirmed by TEM measurement carried out at different pH.

3. Conclusion: Gold nanoparticles are stable colloid solution of clusters of gold atoms with sizes ranging from 1-100nm. At this nano scale AuNPs posses different physicochemical characteristics when compared to the bulk gold. The on-going research efforts are focussed on evaluating the safety of nanomedicine. The great interest is due to eco-friendly, economic, nanomedicine, nano optoelectronics. Hence it is a new emerging area of research in the scientific world.

4. References

1. Ajitha kumar ya B, Reddy PS. Green synthesis and characterisation of silvernanoparticles using Lantana camara leaf extract. Material science and Engineeringc, 2015; 49:373-381.
2. Gan PP, Ng SH, Huang Y, Li SFY. Green synthesis of gold nanoparticles using palm oil mill effluent (POME): a low cost Bioresource Technology, 2012; 113:132-135.
3. Poojary MM, Vishnumurty KA, Adhikari AV. Extraction, characterisation and biological studies of phytochemicals from Mammea Suriga. Journal of pharmacetutical Analysis. 2015; 5:182-189.
4. Acharya AK. Synthesis and characterisation of some silvernanoparticles using reducing agents obtained from fruit extract. International journal of chemical studies. 2014; 2(4):43-45.
5. Sharma VK, Yngard RA, Lin Y. Silver nanoparticles: green synthesis and their anti-microbial activities. Advance in colloid and interface Science, 2009; 145:83-96.
6. Vijaya Kumar M, pRIYA k, Nancy FT *et al*. Biosynthesis, characterisation and antibacterial effect of plat mediated silvernanoparticles using Artemisia nilagirica. Industrial crops and products, 2013; 41:235-240.
7. Mieszawska AJ, Mulder WJH, Fayad ZA, Commode DP. Multifunctional gold nanoparticles for diagnosis and therapy of disease. Molecular pharmaceutics, 2013; 10:837-847.