



Green Chemistry

A green approach to the
synthesis of AuNPs

Applications of nanoparticles (NPs)

- AuNPs (gold nanoparticles) have a wide range of medical applications. They are biocompatible with cell, protein, and DNA-based applications.



Introduction

- I started by learning about Green Chemistry. I reviewed resources and YouTube videos that helped me grasp the concept of Green Chemistry and what a Green Chemistry future would look like.



Principles of Green Chemistry

- Green Chemistry is divided into around 12 principles.
- **1. Prevention**
 - It is preferable to prevent waste rather than treat or clean up garbage that has already occurred.
- **2. Atom Economy**
 - All components employed in the process should be included as much as possible into the final product when using synthetic methods.
- **3. Less Hazardous Chemical Syntheses**
 - Synthetic processes should be designed to employ and manufacture compounds that are low or non-toxic to human health and the environment whenever possible.

Principles of Green Chemistry

- **4. Designing Safer Chemicals**
- Chemicals should be formulated to perform their intended function while being as harmful as possible.
- **5. Safer Solvents and Auxiliaries**
- Auxiliary compounds should be avoided if possible and used only when necessary.
- **6. Design for Energy Efficiency**
- Chemical production energy requirements should be acknowledged for their environmental and economic consequences, and they should be reduced as much as possible.

Principles of Green Chemistry

- **7. Use of Renewable Feedstocks**
- When technically and economically feasible, a raw material or feedstock should be renewable rather than diminishing.
- **8. Reduce Derivatives**
- **9. Catalysis**
- **10. Design for Degradation**
- **11. Real-time analysis for Pollution Prevention**
- **12. Inherently Safer Chemistry for Accident Prevention**

Green Synthesis of AuNPs

- The reducing effect caused by hydroxyl and aldehyde groups in the lignin structure is linked to the green production of gold nanoparticles. Large metal nanoparticles produced after adsorption and reduction on the surface of the LNPs.
- The majority of procedures in the literature involve organic solvents and sodium borohydride.

Creating a strategy for green AuNP synthesis:

- To generate gold nanoparticles, tea leaves are dissolved in an aqueous solution at room temperature (AuNPs). Tea leaves can be used to make gold nanoparticles. resulting in color changes



PROCEDURE

- Throughout the process, water is used as an eco-friendly solvent.
- The tea stock solution is made by vigorously swirling 2.62 g of cardamom tea leaves in water for 15 minutes on a stir plate before filtering through Whatman filter paper.
- The goal is to introduce me to the 12 Principles of Green Chemistry



conclusion/result

- Hazardous toxic chemicals utilized in prior AuNPs synthesis research have been replaced by water and green reagents.



Reference

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- Wang, B., Yang, G., Chen, J., & Fang, G. (2020). Green synthesis and characterization of gold nanoparticles using lignin nanoparticles. *Nanomaterials*, 10(9), 1869.
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