

NanoXact™ Polystyrene-Coated Gold

Solvent Transfer Protocol

Product Numbers: AUYH10, AUYH50, AUYH100

1. INTRODUCTION

This protocol describes a method to transfer nanoComposix's NanoXact™ Polystyrene-Coated Gold Nanoparticles from the supplied solvent (toluene) into another compatible solvent. This allows better flexibility to select a solvent that is more compatible with the user's desired application. The polystyrene coating on the nanoparticles provides a large steric barrier that prevents particle aggregation and provides particle solubility in compatible solvents, including chloroform, DMF, and THF, among other organic solvents. The method involves adding a miscible polar solvent to the toluene particle dispersion, which causes the particles to flocculate. The particles can then easily be collected by centrifugation and redispersed into the desired solvent.

2. MATERIALS & EQUIPMENT NEEDED

- NanoXact™ Polystyrene-Coated Gold nanoparticles *dispersed in toluene*
- Certificate of Analysis (COA) for the gold nanoparticle lot to be used
- Ethanol
 - **NOTE:** other polar solvents, such as methanol, isopropanol, acetone, etc. may be substituted, but may require different solvent ratios than described below)
- Transfer solvent compatible with particles
 - Examples include chloroform, DMF, and THF
- Centrifuge and organic-solvent-compatible centrifuge tubes
- Pipette with organic-solvent compatible tips
- Bath sonicator
- UV-Vis spectrophotometer for QC check (recommended)

3. PROCEDURE

1. Use a pipette to add the desired amount of polystyrene-coated gold nanoparticles in toluene to your centrifuge tube. Next, add ethanol, following a volume ratio of 2 parts toluene to 1 part ethanol. For example, combine 1 mL of polystyrene particles in toluene with 0.5 mL of ethanol.

2. Centrifuge at the speed and duration appropriate for the particle size. See **Table 3.1** below for recommended conditions. These conditions should work well for 1.5 mL total volumes; note that changing the solution volume or centrifuge tube size may require adjustments to the time and/or centrifugation speed.

Table 3.1. Recommended centrifugation conditions

Particle Diameter	Time and Speed
10 nm	15 min at 14500 RCF
50 nm	5 min at 14500 RCF
100 nm	3 min at 14500 RCF

After centrifugation, a clear and colorless supernatant should remain, with a colored pellet of nanoparticles at the bottom of the tube. If the supernatant is strongly colored, you may need to add more **ethanol** and/or increase the centrifugation time.

3. Use a pipette with a fresh tip to carefully remove as much supernatant as possible while leaving the pellet intact.
4. Re-suspend the pellet to the final solution volume using the desired **transfer solvent**: add a volume of the **transfer solvent** to the tube with the particle pellet and bath sonicate until the pellet has completely redispersed (~5-10 min).

NOTE: Ability to resuspend will depend on several factors including the centrifugation conditions, final concentration, and transfer solvent.

4. DETERMINING FINAL GOLD CONCENTRATION

An approximate gold concentration can be determined for the final suspension by taking a UV-Vis measurement of the solution after the solvent transfer is complete.

1. On the product's **CoA**, locate the values for Max OD and Mass Concentration (Au).
2. Divide the Max OD by the Au Mass Concentration to calculate the OD*mL/mg for that material.
3. Measure the OD of the new suspension by UV-Vis.
4. Divide the new suspension's OD by the material's OD*mL/mg value to calculate an approximate gold mass concentration in mg/mL.

This should provide a close approximation of the final gold concentration, although the accuracy may vary depending on solvent due to differences in the refractive index of various solvents.

5. MAXIMIZING SAMPLE RECOVERY

Low sample recovery in the final suspension may be due to loss of material in the supernatant. This is more likely with smaller nanoparticle sizes such as 10 nm gold. Adjustments to the suggested centrifugation conditions in this protocol may be made but care should be taken. Be sure to monitor the consistency of the pellet after centrifugation and re-dispersion. If the pellet appears to be very firm due to excessive increased speeds and durations, longer bath sonication may be required to successfully re-suspend the material.

6. ADDITIONAL RESOURCES

For technical support, contact nanoComposix at (858) 565-4227 x2 or by email at info@nanocomposix.com.