

11/28/2017

Tasklist:

- Fix the NMR of the arginine with AuNP from 10/4/2017
- Finish up NMR from 10/31/2017

➤ Fix NMR of arginine with AuNP from 10/4/2017

-For the convenience of any viewers to this journal, I will also include the NMR spectra of the arginine without any gold that was obtained on 10/4/2017. Please note that figure 1 below is also located on 10/4/2017 entry as this was when the data was obtained.

Figure 1: NMR of Arginine and D₂O (sample 2)

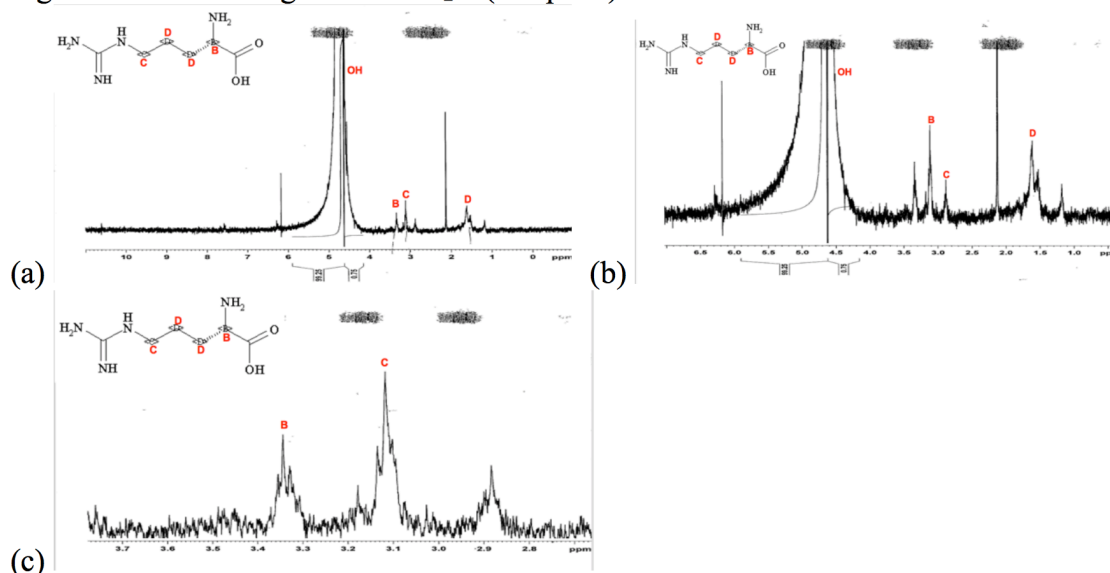


Figure 1 shows the NMR spectrum of arginine and D₂O. The image is broken down into three parts of the spectrum (a), (b), and (c), and all three regions have peaks labeled with carbon atoms located within arginine.

-Since the NMR of the arginine with AuNP did not work on 10/4/2017, the sample was re-prepared and run on 11/28/2017. Figure 2 shows the spectra obtained below. One should not that between the two spectras (Figure 1 and Figure 2), there was an up-field shift from 3.35ppm to 2.55ppm. This shift indicates that gold nanoparticles formed in the arginine with gold sample.

Figure 2: NMR of Arginine with Gold in D₂O

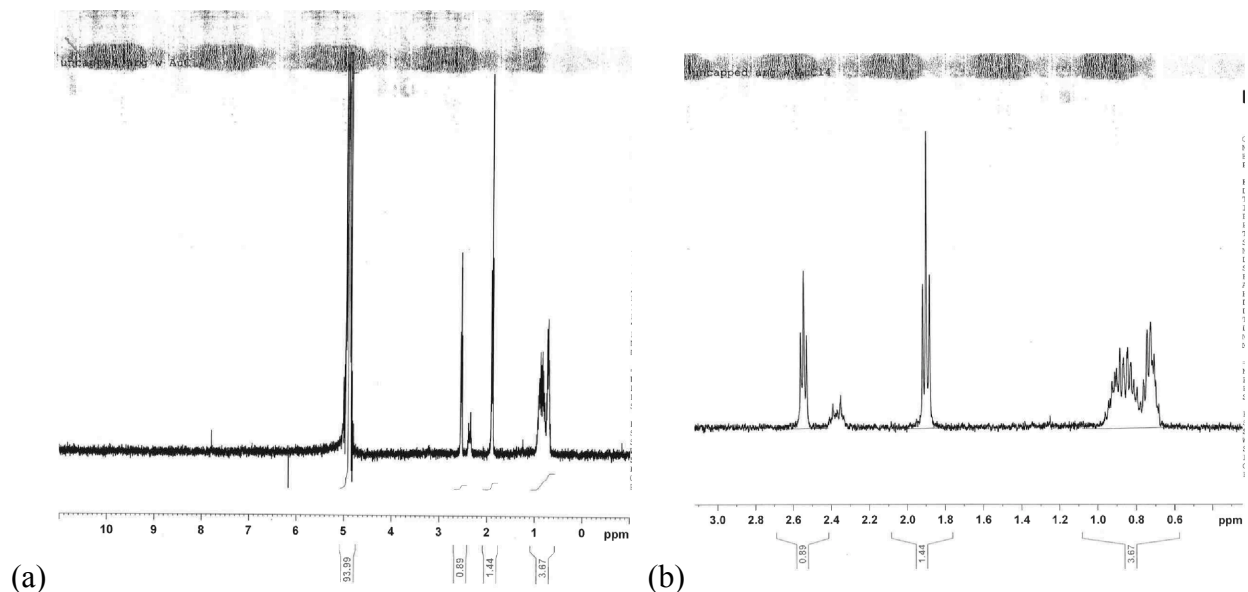


Figure 2 shows the NMR of arginine with gold in D₂O. The image is broken down into images to fit the full spectra onto the document.

➤ NMR from 10/31/2017

-These samples were prepared and ran on 11/28/17; however, they were prepared according to the tasklist and procedure on 10/31/17. Although the NMR procedure called for four samples (two of which required dried gold), we only had enough dried gold tubes for one samples. Thus, we only ran the NMR for the two samples below.

Figure 3: NMR of N-capped Arginine without gold in D₂O

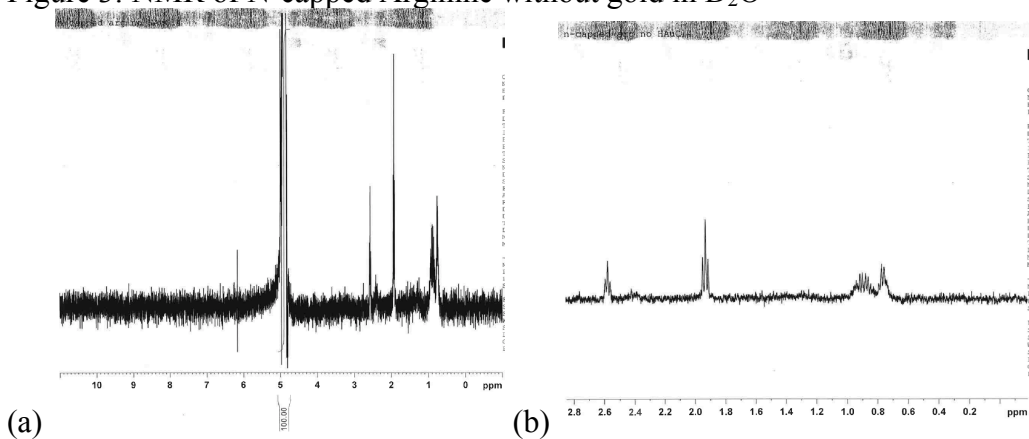


Figure 3 shows the NMR of the N-capped arginine without gold. The image is broken down into images to fit the full spectra onto the document.

Figure 4: NMR of N-capped Arginine with gold in D₂O

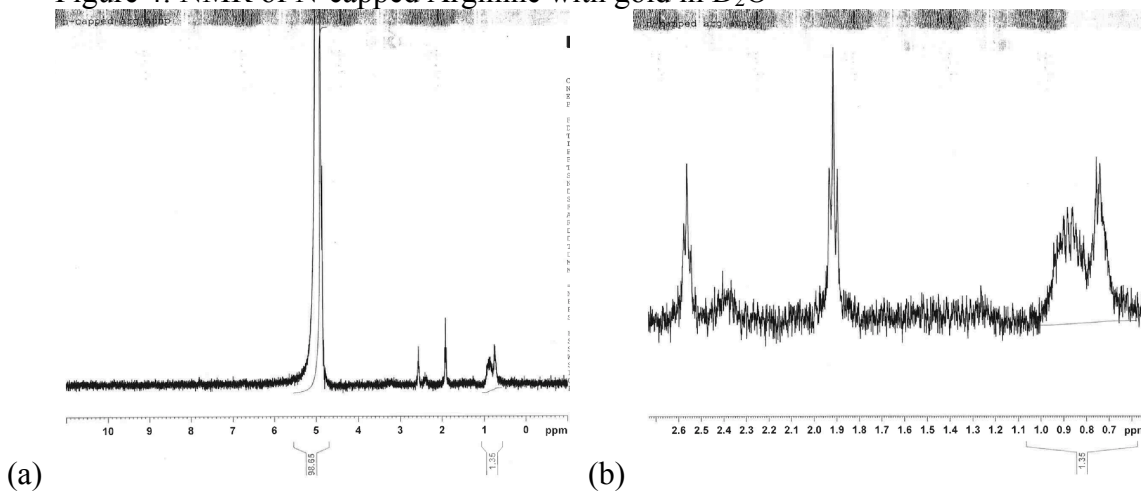


Figure 4 shows the NMR spectra of N-capped arginine with gold in D₂O. The image is broken down into images to fit the full spectra onto the document.

-By comparing figures 3 and 4, one can tell that they are the same spectra. Figure 4 is zoomed in more so than figure 3; however, their peaks occur at the same ppms. Thus, no gold nanoparticles formed in the N-capped arginine with gold, and it can be concluded that the N-cap blocks the hydrogens needed for the reduction process. Therefore, the N-cap prevents gold nanoparticle formation.

-By comparing figure 2 to figures 3 or 4 (as both have the same spectra), the nitrogen responsible for the reduction can be determined. The nitrogen highlighted in yellow below is most likely the nitrogen that loses its hydrogen during gold nanoparticle formation. This is due to the double bond on the nitrogen atom. The nitrogen highlighted in green is the second most likely nitrogen to lose one of its hydrogens during gold nanoparticle formation.

Figure 5: Arginine with Highlighted Nitrogens

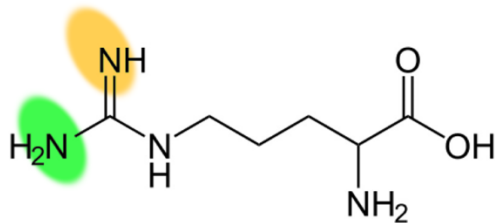


Figure 5 shows the two most likely nitrogens that are contributing their hydrogens to the reduction.