

09/12/2017

Tasklist:

- Prepare 0.1M buffer solutions of pH 10, 11, and 12
- Make a 10mM H_{AuCl}₄ and a 100 mM Amino Acid Solutions
- Prepare buffer for Bradford Analysis
- Prepare buffer for Dialysis
- Prepare buffer for SDS-PAGE

My group did not finish the buffer for the dialysis or the SDS-PAGE. These two buffers were prepared the following classes.

➤ 0.1M Buffer Solutions of pH 10, 11, and 12

-Prepare a solution with an acid and its conjugate base by dissolving the acid form of buffer into about 60% of the volume of H₂O required to obtain final volume

-Acid: Na₂HPO₄

-Conjugate Base: Na₃PO₄

-The objective of the calculations is to find the amount of Na₂HPO₄ and Na₃PO₄ in grams to measure out and add into the volumetric flask.

--> Google pK_a value: 12.32

--> Equation to use: $\text{pH} = \text{pK}_a + \log\left(\frac{[\text{OH}]}{[\text{H}]}\right)$

--> $[\text{H}] = 0.1\text{M}$ since this is a 0.1M buffer solution

--> Calculations for pH 10

Step 1: Find the $[\text{OH}]$

$$\text{pH} = \text{pK}_a + \log\left(\frac{[\text{OH}]}{[\text{H}]}\right)$$

$$10 = 12.32 + \log\left(\frac{[\text{OH}]}{0.1}\right)$$

$$0.0047863 = \frac{[\text{OH}]}{0.1}$$

$$[\text{OH}] = 4.7863 \times 10^{-4} \text{ M}$$

Step 2: Use $[\text{OH}]$ to find the grams of Na₃PO₄

$$4.7863 \times 10^{-4} \text{ M} = \text{moles/volume} = \text{mole} / 0.25 \text{ L}$$

$$\text{moles} = 1.1965 \times 10^{-4}$$

$$\text{moles} = \text{grams} / \text{MW of Na}_3\text{PO}_4$$

$$1.1965 \times 10^{-4} \text{ moles} = \text{g} / 163.94$$

$$\text{Na}_3\text{PO}_4 \text{ grams} = \mathbf{0.019616}$$

Step 3: Use $[\text{H}]$ to find the grams of Na₂HPO₄

$$0.1\text{M} = \text{moles} / \text{volume} = \text{mole} / 0.25\text{L}$$

moles= 0.025
moles= grams/ MW of Na₂HPO₄
0.025 moles= g/ 141.96 MW
Na₂HPO₄ g= 3.549

--> Calculations for pH 11 and pH 12 were calculated using the same method as above.

➤ 10mM HAuCl₄ and a 100 mM Amino Acid Solutions

--> 10 mM HAuCl₄ Solution (Molar Mass of HAuCl₄= 339.785 g/mol)

M= mole/ L
10x10⁻³M = moles/ 0.25 L
Moles= 0.0025

moles= g/MW
0.0025 moles = g/ 339.785 MW
HAuCl₄ grams= 0.8495

--> Prepare Tubes with HAuCl₄, Amino Acid, and Buffer

Note: 3 samples were made for each amino acid because the three different buffers (pH 10, pH 11, and pH 12) were used.

	Amino Acid	HAuCl ₄	Buffer
Arg	1 mL	1 mL	8 mL
Phen	1 mL	1 mL	8 mL
Iso	1 mL	1 mL	8 mL

Below are the pictures of these samples.

Figure 1: AuNP and Amino Acids with pH Buffers

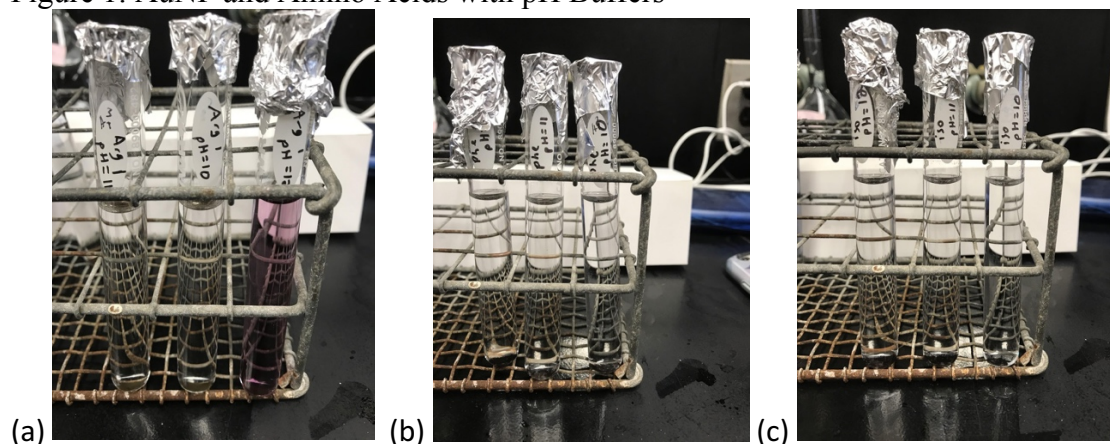


Figure 1 shows the different solutions that contained pH buffers. (a) shows the solutions that contained arginine. The sample with a pH of 12 has a purple hue. The other two samples were completely clear. (b) shows the solutions that contained phenylalanine. All three samples were completely clear. (c) shows the solutions that contained isoleucine. All three samples were completely clear.

➤ Remake H_{AuCl}₄ and Arginine Samples with Varying Concentrations of Arginine

	Arginine	H _{AuCl} ₄	Buffer
Test Tube 1	0.01 mL	1 mL	8.9 mL
Test Tube 2	0.1 mL	1 mL	8.9 mL
Test Tube 3	1 mL	1 mL	8 mL

These test tube sets were completed three different times using buffers pH 10, 11, and 12. Below are the pictures of these samples. Unfortunately, we forgot to take the UV/Vis

Figure 2: AuNP and Arg at Different Arg Concentrations and Different pH

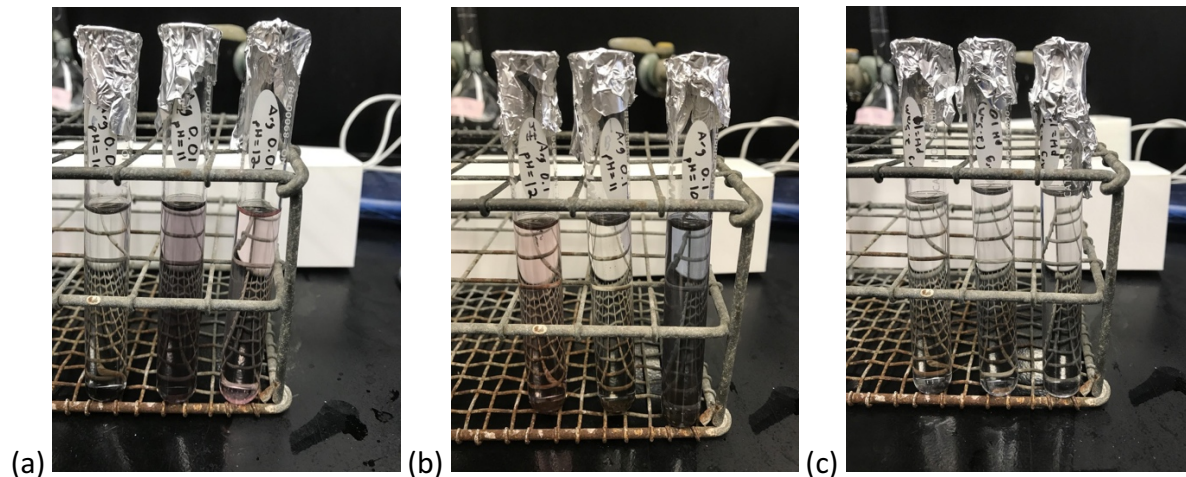


Figure 2 shows AuNP and arginine at different arginine concentrations and at different pHs. (a) shows 0.01 mM of arginine at pHs of 10, 11, and 12. The solution at a pH of 11 had a dark purple hue. The solution at a pH of 12 had a light pink hue. (b) shows 0.1 mM of arginine at pHs of 10, 11, and 12. The solution at a pH of 12 had a slight pink hue, and the solution at a pH of 10 had a dark purple hue. (c) shows 2.5 mM of arginine at pHs 10, 11, and 12. All these solutions were completely clear.

➤ Prepare buffer for Bradford Analysis

- 1 L 50 mM Tris
- 50 mM NaCl
- pH= 7.5

-Calculation:

$$(0.05 \text{ M})(121.14 \text{ MW Tris}) = \mathbf{6.057 \text{ g of Tris}}$$

$$(0.05\text{M})(58.44 \text{ MW NaCl})= \mathbf{2.922 \text{ g of NaCl}}$$