**Exercise #1’: Standard Addition Prep Concentrations**

*Chem 6614 Chemical Instrumentation*

For reasons to be taken up later, it is common to combine both known, standard concentrations and a known volume of unknown in a common volume. This preparative sequence is referred to as a **`Standard Addition’** preparation. You will be doing this next week.

Here’s what you’ll be tasked to do: (See also: **Lab #1**)

1) Take 2 mL of a 0.0200 M Cu2+ secondary standard and 2.00 mL of 0.0200 M Ni2+ secondary

and put them both into a common 100.00 mL volumetric flask and dilute to the mark. This is referred to as the ***`Reference Cu2+ and Ni2+ standard addition stock’.***

2) Take 2 mL of an unknown concentration of Ni2+ and Cu2+ and dilute it to the mark in a

separate, 100.00 mL volumetric flask. This is referred to as the ***‘Unknown Cu2+ and Ni2+***

***standard addition stock’***

3) In five separate, 50.00 mL volumetric flasks deliver the volumes of both ***Reference and***

***Unknown Cu2+ and Ni2+ standard addition stock*** solutions indicated in **Table 1** below and

dilute to the mark. The five flasks are the final, **Standard Addition** sample preps..

**Table 1: Recipe for final Standard Addition samples in 50.0 mL volumetric flasks**

|  |  |  |  |
| --- | --- | --- | --- |
| Flask # | Standard addition # | mL ***Unknown*** stock added | mL of ***Reference***  stock added |
| 1 | 0 | 5.00 | 0.00 |
| 2 | 1 | 5.00 | 5.00 |
| 3 | 2 | 5.00 | 10.00 |
| 4 | 3 | 5.00 | 15.00 |
| 5 | 4 | 5.00 | 20.00 |

The critical question at this point is: what are the known concentrations in ppm (w/v) and M of Cu2+ and Ni2+ from the reference source in our final **Standard Addition** samples ? That is, how do you fill out the empty cells in **Table 2** below ???

**Table 2: Standard Addition Reference Cu2+ and Ni2+ concentrations Based on Table 1 Recipes**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Standard  Addition # | mL **Reference**  stock added | Cu2+ std  (ppm w/v) | Cu2+ std  (M) | Ni2+std  (ppm w/v) | Ni2+ std  (M) |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 5 | 2.542 | 4.000E-5 | 2.348 | 4.000E-5 |
| 3 | 10 | 5.083 | 8.000E-5 | 4.695 | 8.001E-5 |
| 4 | 15 | 7.625 | 1.200E-4 | 7.043 | 1.200E-4 |
| 5 | 20 | 10.17 | 1.600E-4 | 9.391 | 1.600E-4 |

**Note: atomic mass of Cu =63.546 g/nmol atomic mass of Ni=58.693 g/mol**