**Homework #3 : Standard Addition and AAS/ICP methods 20 pts total**

*Your name: \_\_\_\_\_\_\_\_\_ANSWERS\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

* 1. The following standard addition data is obtained where the standard solution volume

 is 5 mL and the concentration of Cu2+ in the standard addition reference is 20 ppm.

 Assume the solutions are all made up to a total of 50 mL. and that 1 standard volume

 of the unknown is present in all the solutions below.

**Cu2+ Standard addition # vs observed Absorbance of Cu at 680 nm**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Reference Std addition#** | **0** | **1** | **2** | **3** | **4** |
| **A(Cu2+)** | **0.16** | **0.29** | **0.42** | **0.54** | **0.67** |

 Use linear regression to find the concentration of the unknown Cu2+ in ppm

A = 0.127x + 0.162, xo= Nu= - 0.162/0.127=1.275. Ccu = Nu\*Cstd = 1.275\*20=25.5
R² = 0.9998

 Unknown [Cu2+(ppm)] = \_\_\_\_\_\_25.5\_\_\_\_\_\_\_  *3 pts*

* 1. **Term Matching (10 pts)**
1. echelle
2. 1800 oC
3. Lvov platform
4. 10,000 oC
5. Chemical broadening
6. echellette
7. Ar
8. ICP
9. Rowland circle
10. Electrothermal AAS

**Graphite tube for sample in HGA \_\_c\_\_\_**

**Gas excited in ICP \_\_\_g\_\_**

**`Special 2D’ grating in modern ICP \_\_a\_\_\_**

**Classic ICP design \_\_i\_\_\_**

**Other name for graphite furnace AAS \_\_J\_\_\_**

**Old style ICP monochromator \_\_f\_\_\_**

**Temperature attained in HGA \_\_b\_\_\_**

**Temperature attained in ICP \_d\_\_\_\_**

**Absorption method \_\_J\_\_**

**Emission method \_\_h\_\_\_**

* 1. **Atomic Spectroscopy Trivia (7 pts)**

**Name three sources of line broadening in AAS (see Skoog)**

**a)\_\_\_\_\_\_\_\_\_Doppler\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**b)\_\_\_\_\_\_\_\_Pressure\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**c)\_\_\_\_\_\_\_\_chemical\_or natural (Heisenburg limit)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**What is a releasing agent ? \_\_La or Sr salt that ties up carbonates etc that would otherwise ppt Ca, Mg etc \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Short-lived alternative AAS source to HCL \_\_\_\_\_\_\_\_EDL electrodeless discharge lamp**

**One practical advantage of ICP over flame AAS\_\_\_\_better sensitivity; multiple element analysis at same time; \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**What is the `Achilles heel’ of AAS methods ? \_\_\_\_\_\_\_laminar flow burner (source of chemical interferences)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**