Lynn Li (ll643) & Allison Tran (ant42)

CEE 4530

Lab 1 Prelab

Due 1/30/2019

1. You need 100 mL of a 1 μM solution of zinc that you will use as a standard to calibrate an atomic adsorption spectrophotometer. Find a source of zinc ions combined either with chloride or nitrate (you can use the internet or any other source of information). What is the molecular formula of the compound that you found? Zinc disposal down the sanitary sewer is restricted at Cornell and the solutions you prepare may need to be disposed of as hazardous waste. As an environmental engineering student you strive to minimize waste production. How would you prepare this standard using techniques readily available in the environmental laboratory so that you minimize the production of solutions that you don’t need? Note that we have pipettes that can dispense volumes between 10 μL and 1 mL and that we have 100 mL and 1 L volumetric flasks. Include enough information so that you could prepare the standard without doing any additional calculations. Consider your ability to accurately weigh small masses. Explain your procedure for any dilutions. Note that the stock solution concentration should be an easy multiple of your desired solution concentration so you don’t have to attempt to pipette a volume that the digital pipettes can’t be set for such as 13.6 μL.

A source of zinc ions is Zinc chloride. The chemical compound for Zinc chloride is ZnCl2. In order to reduce the amount of zinc waste production, we would want to prepare a stronger concentration of zinc and dilute it to the desired concentration rather than produce a large amount of zinc that is the desired concentration. Therefore, to prepare 100mL of a 1μM solution of zinc standard, use a scale to measure out 0.01 moles of ZnCl2 which is 1.36286g (molar mass of ZnCl2 is 136.286g/mol) and dissolve this in 1L of water which will give us a 1L sample that has a concentration of 0.01M (M=mol/vol=0.01mol/1L=0.01M). Then to dilute this sample to 1μM, add 10μL of the stock concentration using a pipette to 99.99mL of water. This process is a dilution factor of 10,000 (100mL/0.1L=10,000). In order to complete this dilution once the 0.01M ZnCl2 solution has been prepared, fill a 100mL volumetric flask halfway with distilled water. Using the smaller pipette, pipette 10μL of the ZnCl2 solution into the volumetric flask, and then fill the remainder of the volumetric flask with distilled water up to the line. Mix thoroughly and check that the volume of the flask is 100mL exactly.

1. The density of sodium chloride solutions as a function of concentration is approximately 0.6985C+ρwater. What is the density of a 1 M solution of sodium chloride?