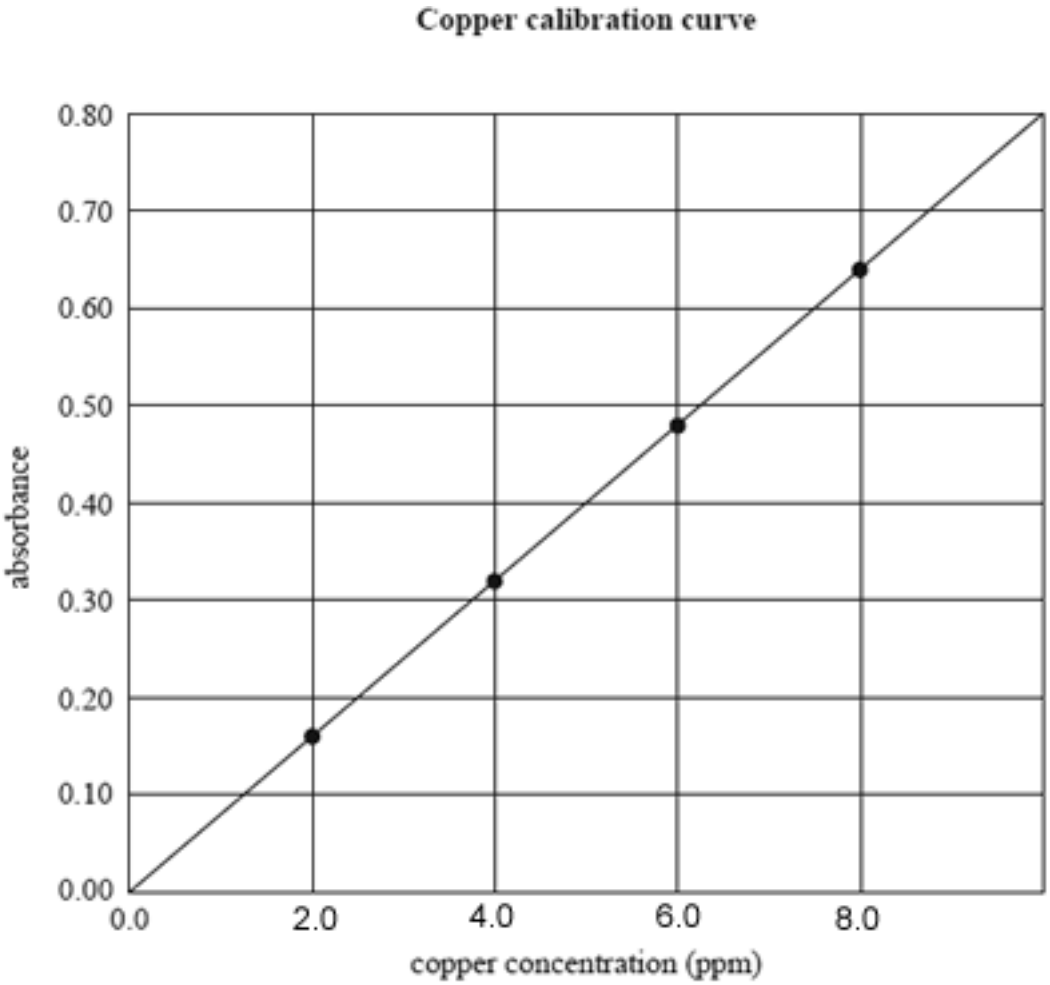
Friday Worksheet **Name: …….**
Volumetric analysis worksheet 7

An atomic absorption spectrometer can be used to determine the level of copper in soils. The calibration curve below plots the absorbance of four standard copper solutions against the concentration of copper ions in ppm.
The concentrations of copper ions in the standard solutions were 2.0, 4.0, 6.0 and 8.0 mg L^{-1}.
(1 mg L^{-1} = 1 ppm)



1) The concentration of copper in a test solution can be determined most accurately from the calibration curve if it is between
   A. 0.0 ppm and 8.0 ppm.
   B. 0.0 ppm and 10.0 ppm.
   C. 2.0 ppm and 8.0 ppm.
   D. 2.0 ppm and 10.0 ppm.

2) If the test solution gave an absorbance reading of 0.40, what would be the concentration of copper ions in the solution in mol L^{-1}?

   Step 1 An absorbance of 0.40, according to the calibration curve, represents a concentration of 5.0 ppm

   ⇨ 5.0 ppm = 5.0 mg/L

Step 2 Find the mol of copper in one litre of solution

⇨ $0.0050/63.5 = 7.9 \times 10^{-5}$ M

3) A sample of meat from a shark caught in Port Phillip Bay was analysed for its copper content.

2.56 grams of shark meat was dissolved in 30.0 mL of 0.210 M HCl. This was then placed in a 250.0 mL volumetric flask and made to the mark with distilled water. A 2.00 mL aliquot was taken from the volumetric flask and analysed in the same absorption spectrometer used in question 1) above.

If the absorbance reading of the sample was 0.64 determine the concentration of copper in the meat in :

i. % w/w

ii. ppm

Step 1 determine the steps taken in the procedure

2.56 grams sample --- -> dissolved in 30.0 mL -----> diluted to 250 mL ------> 2.00 mL analysed

Step 2 Determine the concentration of copper in 2.00 mL sample directly from the calibration curve.

⇨ 8.0 ppm

Step 3 Determine the amount of copper, in grams, in the flask and hence the amount of copper in the sample.

⇨ $8.0 \text{ mg /L} \times 0.250 = 2.0 \times 10^{-3}$ grams

Step 4 determine the concentration in %(w/w)

⇨ $(2.0 \times 10^{-3} / 2.56) \times 100 = 0.078\%(w/w)$

⇨ In ppm

⇨ Since the concentration 0.078%(w/w) is 0.078 grams per 100 grams
convert to mg per kilogram
78 mg / 0.100 Kg
780 ppm