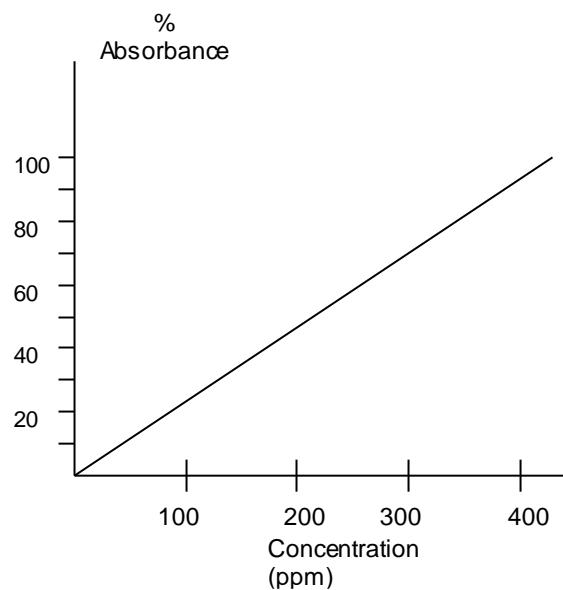# CALIBRATION GRAPHS – TOPIC TEST 1

QUESTION 1

The following is a calibration curve for colorimetric analysis of a particular substance:
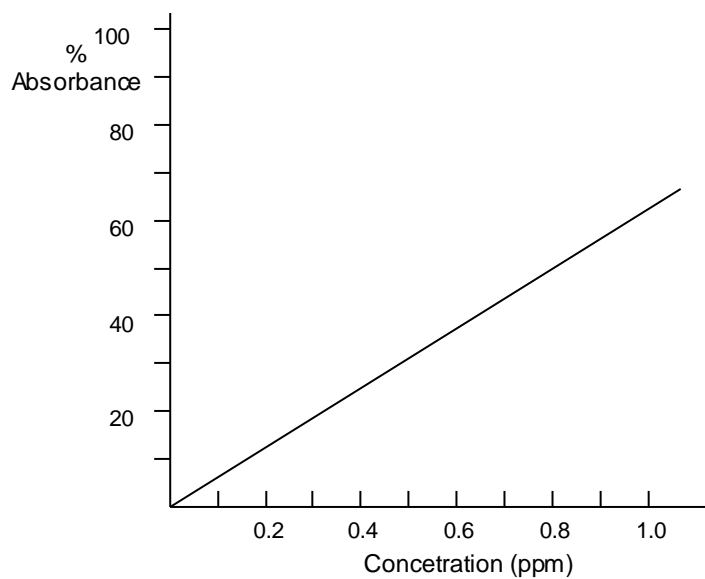

If the absorbance reading for the test sample were 70%, then the concentration would be:

A   250ppm
B   300ppm
C   350ppm
D   Off the scale

QUESTION 2

The following is a calibration graph from an atomic absorption analysis:
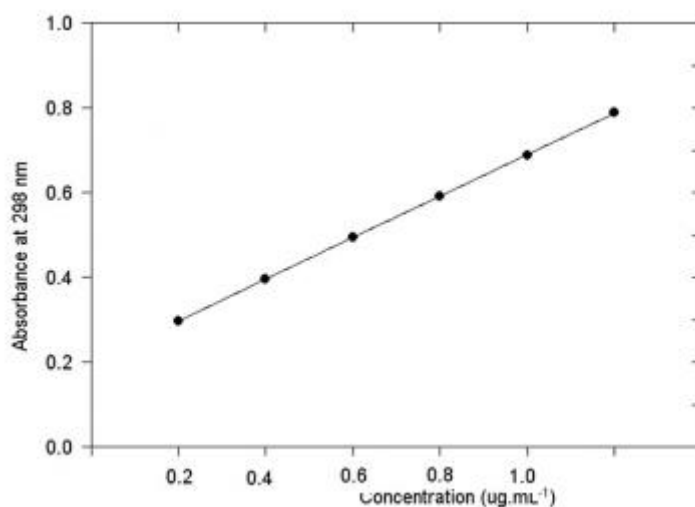

If the absorbance for the test sample is 50% and the original sample was diluted by a factor of 10, the concentration of the metal is:

A 8.0ppm
B 0.8ppm
C 80ppm
D 4ppm

QUESTION 3

Levofloxacin is a broad spectrum antibiotic which can be analysed using HPLC. One such analysis produced the calibration graph shown below.

A sample containing Levofloxacin was analysed. If the concentration of Levofloxcin was 0.6 µg/mL, what would the absorbance reading have been?

A. 0.8
B. 0.5
C. 0.65
D. 0.55

QUESTION 4

The presence of copper in drinking water from the corrosion of copper pipes is a health concern and is carefully monitored. A technician analysed a sample of water from 'Anytown' using AAS. He first analysed a set of standard copper solutions. His results are shown in Table 1.

Table 1. Absorbance data for the calibration standards.

| ppb Cu	Absorbance	Mean Absorbance
10.0	0.058	0.059
	0.060	
	0.058	
50.0	0.332	0.333
	0.340	
	0.328	
100.	0.656	0.654
	0.659	
	0.648	
200.	1.349	1.348
	1.346	
	1.346	

His result from the analysis of the town's water supply are shown below.

Table 2. Absorbance data of Cu for Anytown water.

Sample	Absorbance
Anytown water	1.274
	1.268
	1.276

(a)   Why did the technician take three readings for each of the standard solution and sample? (1 mark)
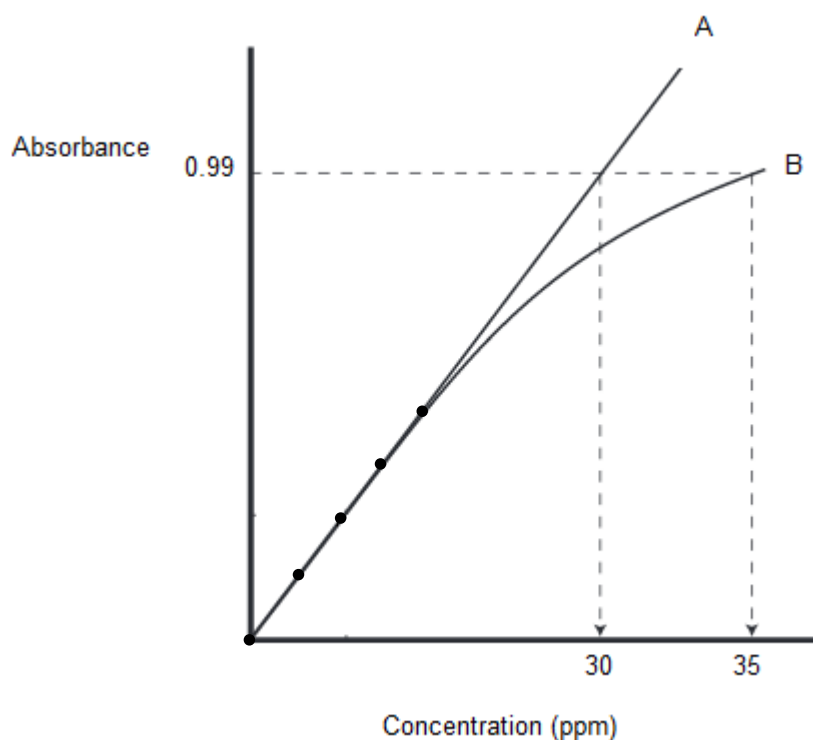
(b)　Draw the calibration curve for the analysis. (3 marks)
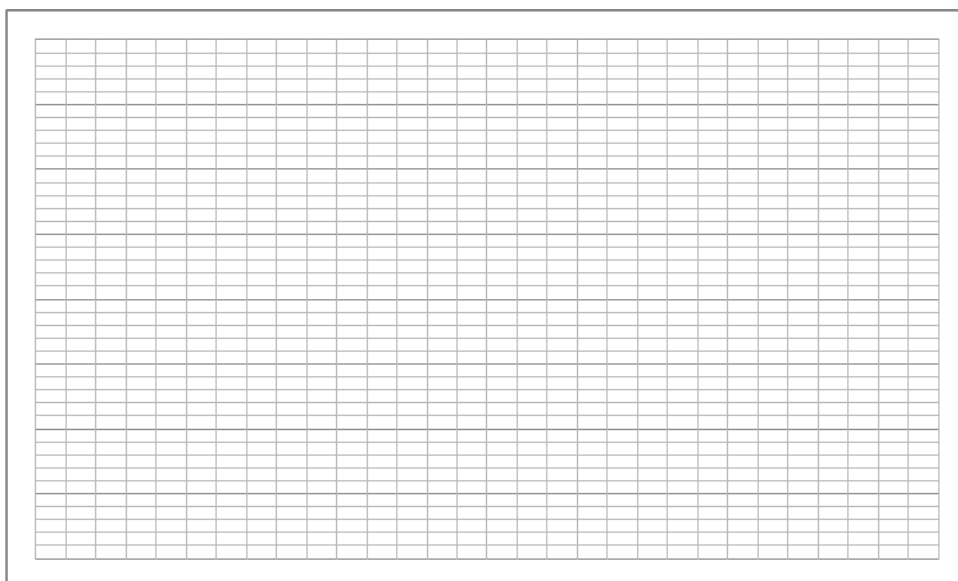
(b)　What is the concentration of copper in the sample? (1 mark)

QUESTION 5

Line A on the graph below shows the calibration curve drawn by a student performing an analysis of Fe via atomic absorption spectroscopy. The student measures the absorbance of the sample and finds it to be 0.99.

(a) What mistake has the student made when drawing the calibration curve? (1 mark)

(b) What does Line B represent? Explain why Line B is initially linear but then starts levelling out. (2 marks)

(c) What should the student do to accurately analyse the sample? (1 mark)

(d) What is the percent error in the students result? (2 marks)
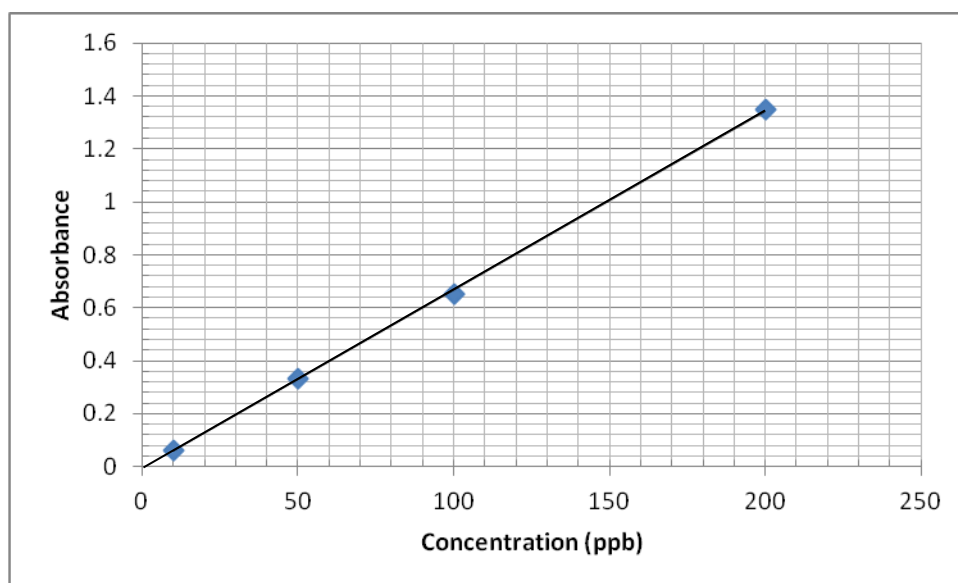
SOLUTIONS

QUESTION 1   Answer is B

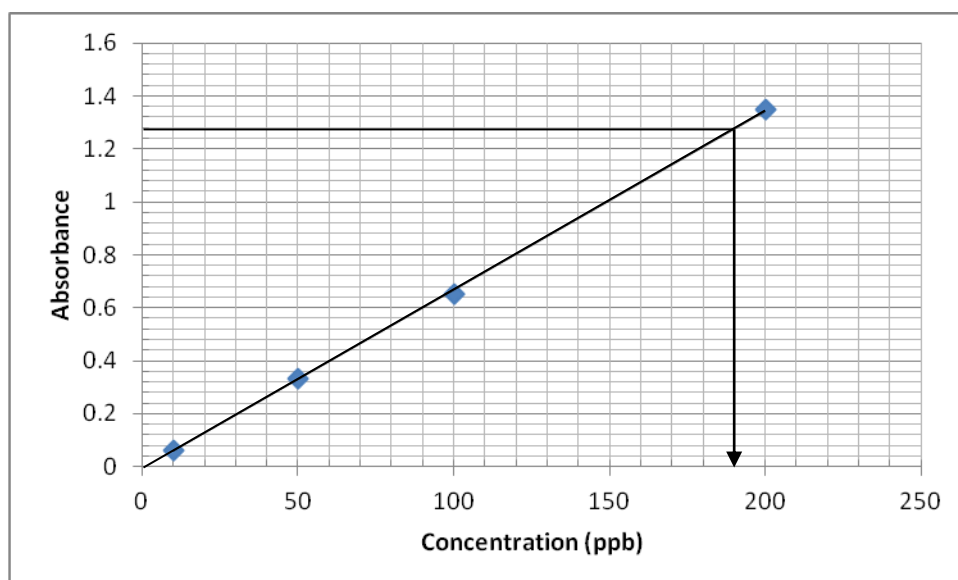**QUESTION 2**   Answer is A

QUESTION 3   Answer is B

QUESTION 4

a.   To improve the accuracy of the results by reducing random errors.

b.

c.

The c(Cu) = 190 ppb

QUESTION 5

a. The student has extrapolated the calibration curve beyond the absorbances obtained from the standard solutions.

b. Line B represents the actual absorbance of the sample at high concentrations. The line start off being linear since the relationship between concentration and absorbance is linear at low concentrations. As the concentration increases, this relationship breaks down and is no longer linear.

c. The student should dilute the sample so that its absorbance falls on the linear section of the calibration curve.

d. $\% \text{ error} = \dfrac{35-30}{35} \text{ x } 100 = 14\%$