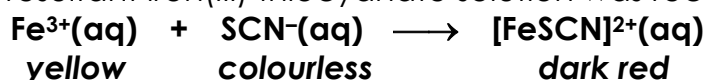


## Quiz (Colorimetry)

1. A sample of iron(III) chloride solution was allowed to react with excess sodium thiocyanate solution, forming iron(III) thiocyanate solution. The absorbance of the resultant iron(III) thiocyanate solution was recorded by colorimetry.



A set of standard iron(III) thiocyanate solutions was used to construct a calibration curve. The absorbance values were recorded as follows:

Concentration of $[\text{FeSCN}]^{2+}(\text{aq})$ ( $\text{mg dm}^{-3}$ )	Absorbance
0.00	0.000
1.00	0.195
1.50	0.287
2.00	0.379
2.50	0.465
3.00	0.550

- (a) Explain why excess sodium thiocyanate solution was added to the sample of iron(III) chloride solution.
- (b) Using the data in the above table, plot a calibration curve for iron(III) thiocyanate solutions.
- (c) What would be the concentration of the resultant iron(III) thiocyanate solution if it had an absorbance of 0.250?
2. Erioglaucine is a food colouring. It dissolves in water to give a reddish blue solution. A set of standard solutions of erioglaucine was used to construct a calibration curve. Their absorbance values were recorded as follows:

- (a) Using the data in the above table, plot a calibration curve of erioglaucine solutions.

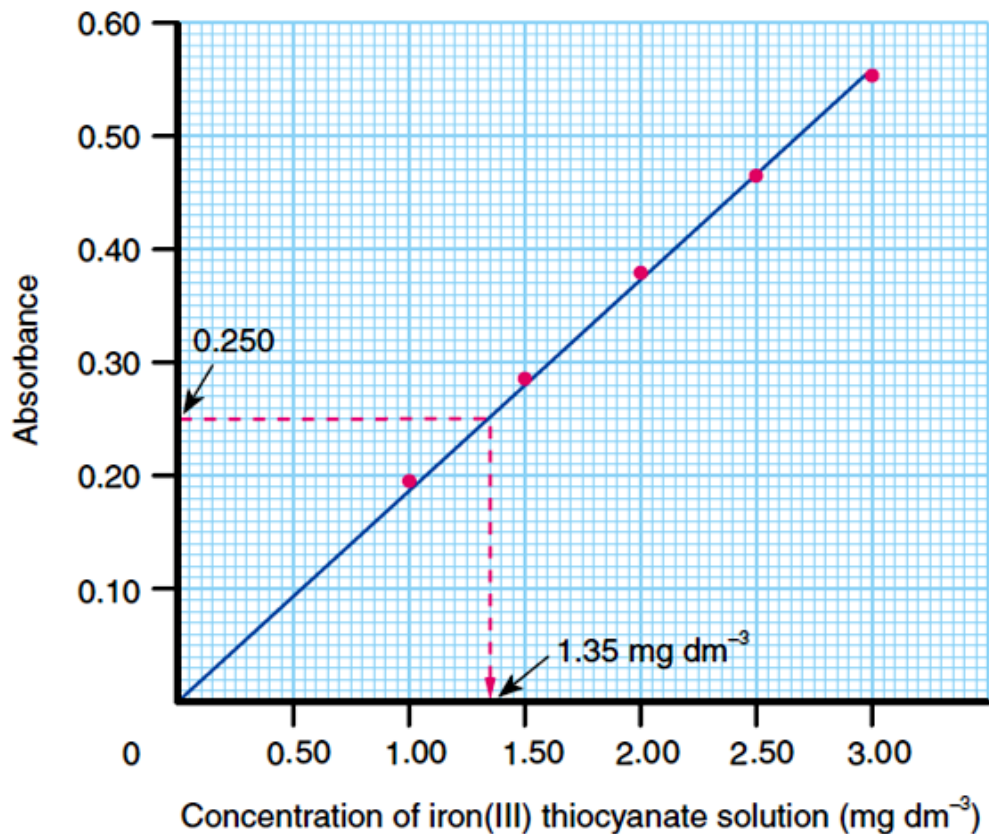
Concentration of erioglaucine ( $10^{-5} \text{ M}$ )	Absorbance
0.2	0.197
0.4	0.392
0.6	0.583
0.8	0.779
1.0	0.972

- (b) A student weighed 0.0014 g of erioglaucine. The powder dissolved in water and the solution was made up to 250.0  $\text{cm}^3$ . The absorbance of the resultant solution was 0.680.
- (i) Determine the concentration of the solution prepared.
- (ii) Estimate the relative molecular mass of erioglaucine.

**Suggested Answer**

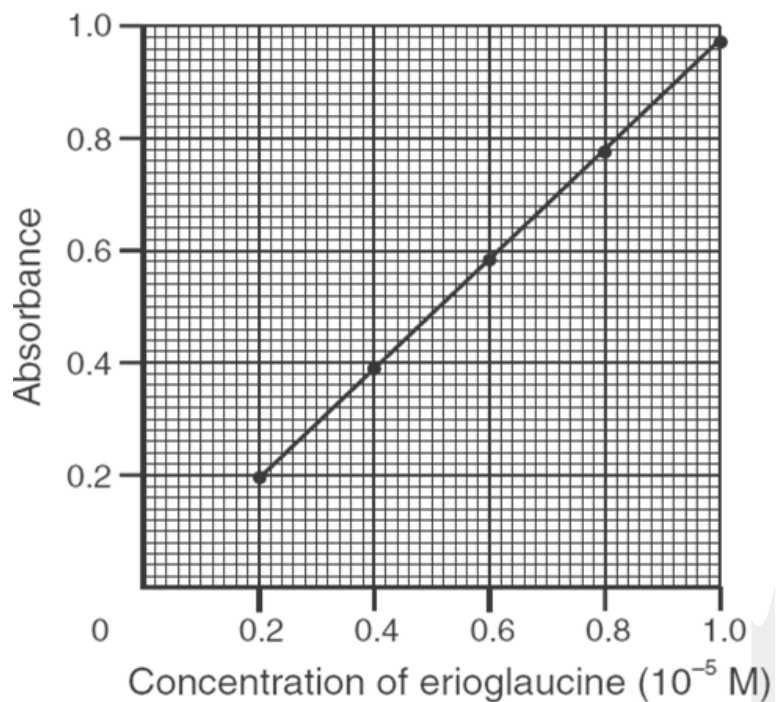
1. (a) To ensure all iron(III) chloride solution reacted to form dark red iron(III) thiocyanate solution.

(b)



(c) From the calibration curve, the concentration of the resultant iron(III) thiocyanate solution is found to be 1.35 mg dm<sup>-3</sup>.

2. (a)



(b) (i) From the calibration curve, the concentration of the solution prepared was  $0.7 \times 10^{-5}$  M.

(ii) Number of moles of erioglaucine  
 $= 0.7 \times 10^{-5} \times 0.25$   
 $= 1.75 \times 10^{-6}$

Molar mass of erioglaucine  
 $= 0.0014 / 1.75 \times 10^{-6}$   
 $= 800 \text{ g mol}^{-1}$

$\therefore$  Relative molecular mass of erioglaucine is 800.