

Concentration, separation and absorbance

AP Chemistry · Lab answers

Model answers use the sample data. If your values differ slightly, the method and the proportionality should still hold. Report concentrations in mol/L with scientific notation and give results to two or three significant figures.

Level: AP Chemistry · **Curriculum:** AP Chem Unit 3

Question 1 Check the concentrations

$$M_2 = M_1 V_1 / V_2 = 1.00 \times 10^{-5} \times 10.0 / 25.00 = \mathbf{4.00 \times 10^{-6} \text{ mol/L.}}$$

Question 2 Why a blank

The blank removes the absorbance of the cuvette and solvent, so **the reading is due only to the dye.**

Question 3 Plot the graph

The points lie on a straight line through (almost) the origin: **A is proportional to c**, so the law is obeyed over this range.

Question 4 Gradient

$$\text{Gradient} = (1.036 - 0.131) / ((8.00 - 1.00) \times 10^{-6}) = 0.905 / 7.00 \times 10^{-6} = 1.29 \times 10^5 \text{ L/mol. With } b = 1.00 \text{ cm, } \epsilon = \mathbf{1.29 \times 10^5 \text{ L/(mol}\cdot\text{cm).}}$$

Question 5 Concentration of the drink

$$c = 0.405 / (1.30 \times 10^5) = \mathbf{3.1 \times 10^{-6} \text{ mol/L.}}$$

Question 6 Mass concentration

$$m = 3.1 \times 10^{-6} \times 792.9 = 2.46 \times 10^{-3} \text{ g} = \mathbf{2.5 \text{ mg/L.}}$$

Question 7 Choice of wavelength

A blue solution absorbs red-orange light most strongly. **Red light gives the highest absorbance and so the greatest sensitivity.**

Question 8 Improvements

Pipetting small volumes (2.50 mL) has a large percentage uncertainty. Use a larger stock volume and a larger flask, or prepare standards by a serial dilution. **This lowers the percentage uncertainty in c .**