UV-VISIBLE SPECTROSCOPY – IN ANALYSIS

I am concentrating in these questions on using UV-visible spectroscopy in measuring concentrations of dilute solutions.

1. The Beer-Lambert Law can be expressed as: $A = \varepsilon l c$

where A is the absorbance of a solution of a substance, ε is the molar absorptivity at a particular wavelength, l is the length of the solution the light is passed through and c is its concentration. If you could measure A and l for a given solution, and knew the value of ε, then you could calculate the concentration of the solution.

a) Assuming you had a spectrometer which would measure the absorbance of a particular substance at whatever wavelength you choose, and that you can obviously measure the length of the cell containing the solution, what are the problems with using this equation?

b) A simple alternative method which avoids problems is to plot a calibration curve for the particular spectrometer and substance you are using. Explain how you would do this to find the concentration of a dilute solution of something strongly coloured like one containing manganate(VII) ions – potassium manganate(VII) solution, for example.

c) Explain briefly how what you have described overcomes whatever problems you suggested in part (a)