

Name: _____

- (c) (5 pts) Student A has decided that the pH of her buffer solution is too high and so has added 10 mL of a 1 M solution of HCl to it. Calculate the expected pH after adding the HCl.
2. Many proteins that contain metal atoms absorb light in the visible range quite strongly. For instance, the absorption spectrum of hemoglobin has peaks at approximately 420 and 550 nm, which are due to the iron-containing heme groups. The molar extinction coefficient at 420 nm is approximately $5 \times 10^5 \text{ cm}^{-1} \text{ M}^{-1}$, and the molar mass is 64,000 g/mol.
- (a) (3 pts) A student has been given a sample of human blood and instructed to measure the concentration of hemoglobin in it. He realizes that the absorption is so strong that he will have to dilute it in order to obtain a reliable measurement. After a few tries, he discovers that a sample diluted 1000-fold gives an absorbance of 1.4 at 420 nm, in a cuvette with a path length of 1 cm. Calculate the molar concentration of hemoglobin in both the diluted sample and the undiluted blood.

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(b) (3pts) Calculate the concentration of hemoglobin in undiluted blood, in units of mg/mL.

3. Another student suggests that it might be a good idea to measure the hemoglobin concentration using the Bradford dye-binding assay.

(a) (3 pts) What advantage might the Bradford assay have for this situation?

(b) (3 pts) What disadvantage might the Bradford assay have for this situation?"