

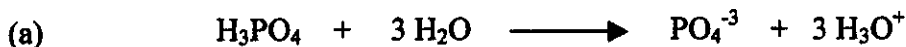
NAME: _____

1. (16 POINTS) What quantities are plotted on the x- and y-axes of:

	<u>x-axis</u>	<u>y-axis</u>
(a) an absorption spectrum?	_____	_____
(b) a chromatogram?	_____	_____

2. (8 POINTS) Define the term "retention time". What is its principal use in GC analysis?

3. (12 POINTS) Write the equilibrium constant expressions for the following balanced chemical reactions:



K = _____



K = _____



K = _____

4. (24 POINTS) Suppose that you are given the task of determining the SCN^- content of a blood sample by forming the $\text{Fe}(\text{SCN})^{2+}$ complex and measuring its absorbance. You begin by taking a 10.00-mL portion of the blood sample, centrifuging it, transferring 0.25 ml of the clear serum to a flask, and adding 5.00 ml of 0.20M Fe^{3+} . The %T of this solution, measured at 450 nm, is 51.5%. A calibration curve, prepared from $\text{Fe}(\text{SCN})^{2+}$ standards, indicates that the $\text{Fe}(\text{SCN})^{2+}$ concentration of the diluted sample solution is 0.064 mM.

(a) Calculate the SCN^- content (in mM) of the blood sample. SHOW ALL WORK CLEARLY. (Atomic weight of Fe = 55.85 gram/mole; formula weight of SCN^- = 58.08 gram/mole)

(b) What is the absorbance of the diluted sample solution?

5. (24 POINTS) Draw block diagrams of each of the following analytical instruments, labeling all the important components.

(a) a gas chromatograph (GC)

(b) a visible spectrophotometer (e.g., the Spectronic 20)

6. (16 POINTS) Sketch the shape of the titration curves expected for the following titrations:

(a) HCl with NaOH

pH



mL NaOH

(b) Na_2CO_3 with HCl

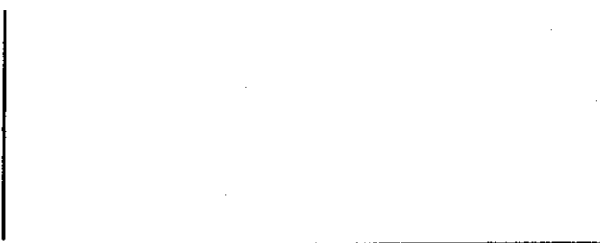
pH



mL HCl

(c) NaOH with HCl

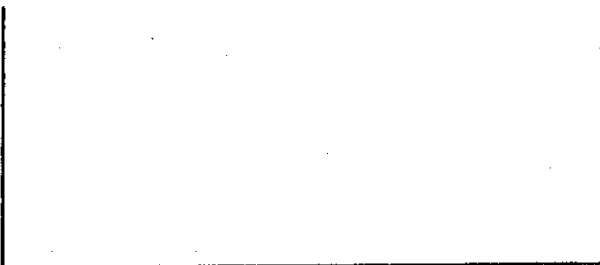
pH



mL HCl

(d) KHP with NaOH

pH



mL NaOH