CHE 226 **ANALYTICAL CHEMISTRY** **Fall 2003**

EXAM I -- September 25, 2003

Name _____

WRITE YOUR NAME ON EACH EXAM PAGE NOW. THERE ARE 7 QUESTIONS AND 105 PERCENT TOTAL IN THIS EXAM.

Show clearly all work on these pages. Use the proper number of significant figures and the correct units in all final answers. You must show your calculations and/or reasoning, **including equations**, on a question to obtain any credit; no credit for answers appearing out of the blue. Your work must be understandable at the time it is being graded to obtain any partial credit.

You do not have to do the *final* arithmetic, as long as the answer is expressed in its final form and all algebraic manipulations have been made. Little will be subtracted for routine *arithmetic* errors. A calculator may be used, but not shared with anyone else.

A sheet of scrap paper is at the back of the exam booklet. Tear it off now.

Unless otherwise stated, assume all solutions are aqueous, density = 1.0000 g/mL; activity coefficients are unity (i.e., activity = concentration); temperature, $T = 298$ K; $K_w = 1.008 \times 10^{-14}$.

QUESTION 1	_____ /21	Question 7	_____ /18
QUESTION 2	_____ /6	Question 8	_____ /
QUESTION 3	_____ /12	Question 9	_____ /
QUESTION 4	_____ /6	Question 10	_____ /
QUESTION 5	_____ /18	Question 11	_____ /
QUESTION 6	_____ /24	TOTAL	_____ /105

Name _____

1. (21 points) Assume anhydrous calcium phosphate, $Ca_3(PO_4)_2$, molar mass = 310.18, is a "primary standard" compound. A 1.00-g sample of pure, dried calcium phosphate is dissolved carefully in excess dilute HCl, which essentially converts the phosphate ion into several of its protonated forms. The resultant solution is diluted to exactly 500.0 mL. Calculate the –

   (a) Moles of calcium phosphate taken.

   (b) Molar concentration of calcium ion in the final solution

   (c) Parts per million (ppm) of phosphorus (P) in the final solution (NOT phosphate, but phosphorus). Atomic mass of phosphorus = 30.9737

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2. (6 points) List two characteristics of indeterminate or random error.

3. (12 points) Define the following terms.

a. Accuracy

b. (Solvent) Autoprotolysis

c. The median