CH300

EXAM IV

November 23, 1998

My mom/dad calls me: ____________________ W4/19D

DIRECTIONS: This examination is in two parts. PART I consists of 8 multiple choice questions (worth 32 points). Circle the correct answer. PART II (worth 68 points) involves questions of general nature requiring write-up on your part. Be brief, clear and to the point.

IMPORTANT: READ AND UNDERSTAND EACH QUESTION CAREFULLY BEFORE ATTEMPTING TO ANSWER IT. IF YOU ARE IN DOUBT ABOUT ANY QUESTION, PLEASE CHECK WITH ME BEFORE YOU ANSWER IT.

GOOD LUCK

RELAX, STAY CLAM AND DO YOUR BEST

PART I: MULTIPLE CHOICE QUESTIONS: (32 pts)

1. For each pair, pick the strongest acid:

   A

   and

   B

   C

   and

   D

   E

   and

   E

a) A,D,F  b) A,C,E  c) B,D,F  d) B,C,E  e) none of these
2. For each pair, pick the **most** stable species:

- **A** and **B**
- **C** and **D**
- **E** and **E**

a) A,C,E  b) B,C,F  c) B,D,F  d) A,D,F  e) none of these

3. From the following compounds **circle** the one which would show major **UV absorption** at **longest** wavelength:

- **a)**
- **b)**
- **c)**
- **d)**
- **e)**
4. For each pair, pick out the stronger base:

\[ \text{NaOH} \quad \text{or} \quad \text{NaHCO}_3 \]

A

or

B

C

or

D

E

or

E

a) A, D, E  b) A, C, E  c) B, D, E  d) B, D, F  e) none of these

5. Which of the following compounds is most acidic?

a) Hexanitroethane  
b) Tetranitromethane  
c) Trinitromethane  
d) Hexaphenylethane  
e) Triphenylmethane

6. Which of the following molecules would you expect to be the strongest base?

a) Tetrahydropyrrole  
b) Pyrrole  
c) 1,3-Cyclopentadiene  
d) Furan  
e) Benzeneamine
7. Which reagent would serve as the basis for a simple chemical test to distinguish between aniline and β-Naphthol?
   a) cold dilute NaOH
   b) cold dilute NaHCO₃
   c) cold conc. H₂SO₄
   d) cold dilute HCl
   e) More than one of these

8. Which of the following hydrocarbons possesses the most acidic hydrogen?

   ![Diagram of hydrocarbons]

   (a) 1
   (b) 2
   (c) 3
   (d) 4
   (e) 5

PART II

I. Briefly, but clearly, explain each of the following observations: (40 pts)
   1) 2,5-Cyclohexadienone readily dissolves in aqueous sodium hydroxide solution.
2) 1-Azacyclopentan-2-one contains an NH group, yet it is insoluble in hydrochloric acid.

3) Ω-nitrophenol is more acidic than its para-isomer.

4) 1,1-Dimethylethyl carbcation is more stable than n-butyl carbcation.
5) The dipole moment of 4-methoxybenzenecarboxaldehyde is more than its calculated value.

II. For each of the following clearly distinguish each pair: *pair* suggest a UV absorption maximum that will (12 pts.)

a) 1-Butanal and 2-Butenal

b) Acetic acid and Benzoic acid

c) and
IV. You are given a mixture of naphthalene (moth balls), naphthalene-2-carboxylic acid and naphthalene-2-amine. Show stepwise how you will proceed to separate this mixture chemically into pure components. (10 pts.)

V. An organic compound of M.F. C₄H₆O₂ gives the following spectral data:
   ir: 1750 cm⁻¹(s); 1660 cm⁻¹(m)
   uv: no strong absorption between 210 - 400 nm.
   Deduce the structure of the organic substance. Explain your reasoning clearly. (10 pts.)