Chem 30A Fall 2005

QUIZ #3
(15 Min)

Weds Dec 7th

INTERPRETATION OF THE QUESTIONS IS PART
OF THE EXAM – DO NOT ASK FOR THE
QUESTIONS TO BE EXPLAINED TO YOU

***DO NOT OPEN THIS EXAM UNTIL INSTRUCTED TO DO SO***

ONLY ONE QUESTION ON THIS EXAM WILL BE GRADED

BY PLACING AN 'X' IN THE APPROPRIATE BOX BELOW, INDICATE
WHICH QUESTION YOU WOULD LIKE US TO GRADE

Q1 [ ] Q2 [ ]

(IF NO BOX IS MARKED, WE WILL GRADE Q1)
(IF BOTH BOXES ARE MARKED, WE WILL GRADE Q1)
(IF IT IS AMBIGUOUS WHICH BOX IS MARKED, WE WILL GRADE Q1)

I can’t believe it! Reading and writing actually paid off!
- Homer Simpson
Q1: Answer the questions below by circling either True or False (2 points each) –

a. The rate of an S_N1 reaction is independent of the strength of the nucleophile. True False

b. Formic acid (HCO_2H) is a polar protic solvent True False

c. E2 and S_N2 reactions share a common carbocation intermediate True False

d. Doubling both the concentration of the nucleophile and the electrophile in an S_N1 reaction doubles the rate of the reaction. True False

e. The methyl thiolate anion (MeS^-) is less nucleophilic than methane-thiol (MeSH). True False

f. The Cope elimination requires an antiperiplanar relationship between the leaving group and the beta-H atom. True False

g. Skeletal rearrangements are never observed in elimination reactions. True False

h. tert-Butyl bromide undergoes S_N1 solvolysis in water more rapidly than it does in aqueous methanol. True False

i. (S)-2-Bromopentane reacts with potassium cyanide (KCN) in acetone to give (R)-2-cyano-pentane as the major product. True False

j. tert-Butyl chloride undergoes S_N1 solvolysis in water more rapidly than tert-butyl iodide. True False

k. 2-Bromobutane reacts with sodium ethoxide in ethanol to give 1-butene as the major product. True False

l. The Hofmann elimination observed with some quaternary trimethylammonium salts (R–N(CH_3)_3)^+ proceeds with syn stereospecificity. True False

m. S_N1 reactions are often favored over E1 reactions at higher reaction temperatures. True False

n. Methyl iodide undergoes E2 reactions when treated with very strong bases. True False

o. S_N1 reactions of secondary benzylic bromides with methanol (MeOH) proceed slower in water than in acetone. True False

BONUS QUESTION

Draw the major product of the E2 elimination reaction shown below (5 points) –

![E2 elimination reaction diagram]
Q2: A little history quiz... in which century did the following famous people die? For each name, circle one answer (Note: the 20th century ran from Jan 1st 1901 until Dec 31st 2000, and the 19th from Jan 1st 1801 until Dec 31st 1900, etc...). 3 points each.

a. Albert Einstein  
   19th 20th

b. Leonardo da Vinci  
   16th 17th

c. Galileo Galilei  
   16th 17th

d. Louis Pasteur  
   19th 20th

e. Benjamin Franklin  
   18th 19th

f. Isaac Newton  
   17th 18th

g. Linus Pauling  
   20th 21st

h. Francis Crick (as in Watson and Crick of DNA fame)  
   20th 21st

i. Michael Faraday  
   18th 19th

j. Marie Curie  
   19th 20th

**BONUS QUESTION**

In class I talked about the Gunpowder Plot and the plan to blow up the Houses of Parliament in England during the reign of King James I, in what year did the failed plot happen (5 points)?
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Q1: Answer the questions below by circling either True or False (2 points each) –

a. The rate of an $S_N2$ reaction is independent of the strength of the nucleophile.  True  False

b. Formic acid (HCO$_2$H) is a polar aprotic solvent  True  False

c. E1 and $S_N1$ reactions share a common carbocation intermediate  True  False

d. Doubling both the concentration of the nucleophile and the electrophile in an $S_N2$ reaction doubles the rate of the reaction.  True  False

e. The methyl thiolate anion (MeS$^-$) is more nucleophilic than methane-thiol (MeSH).  True  False

f. The Cope elimination requires a syn-periplanar relationship between the leaving group and the beta-H atom.  True  False

g. Skeletal rearrangements are sometimes observed in elimination reactions.  True  False

h. tert-Butyl bromide undergoes $S_N1$ solvolysis in aqueous methanol more rapidly than it does in water.  True  False

i. (S)-2-Bromopentane reacts with potassium cyanide (KCN) in acetone to give (S)-2-cyano-pentane as the major product.  True  False

j. tert-Butyl iodide undergoes $S_N1$ solvolysis in water more rapidly than tert-butyl chloride.  True  False

k. 2-Bromobutane reacts with sodium ethoxide in ethanol to give 2-butene as the major product.  True  False

l. The Hofmann elimination observed with some quaternary trimethyl-ammonium salts (R–N(CH$_3$)$_3$)$^+$ proceeds with anti stereospecificity.  True  False

m. E1 reactions are often favored over $S_N1$ reactions at higher reaction temperatures.  True  False

n. Methyl iodide doesn’t undergo E2 reactions when treated with strong bases.  True  False

o. $S_N1$ reactions of secondary benzylic bromides with methanol (MeOH) proceed slower in acetone than in water.  True  False

**BONUS QUESTION**

Draw the major product of the E2 elimination reaction shown below (5 points) –

![Image of the reaction](image)
Q2: A little history quiz... in which century did the following famous people die? For each name, circle one answer (Note: the 20th century ran from Jan 1st 1901 until Dec 31st 2000, and the 19th from Jan 1st 1801 until Dec 31st 1900, etc...). 3 points each.

a. Marie Curie 20th 19th
b. Michael Faraday 19th 18th
c. Francis Crick (as in Watson and Crick of DNA fame) 21st 20th
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