Chem 30A Winter 2005

QUIZ #2
(15 Min)

Weds Feb 16th

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

USE CAPITAL LETTERS WHEN FILLING IN THE BOXES AND BE CLEAR – IF WE CAN’T FIGURE OUT WHAT A LETTER IS, IT WILL AUTOMATICALLY BE GRADED AS INCORRECT

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

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ANSWER TO BONUS QUESTION

\[ \text{Answer: } +5 \]
Questions 1–10 are worth 3 points each. The bonus is worth 5 points.

1. The correct assignment of the stereocenters in the naturally occurring enantiomer of ephedrine (shown below) is?

   ![Ephedrine](image)

   - A 1S,2S
   - B 1R,2S
   - C 1R,2R
   - D 1S,2R
   - E Are you crazy, what are you talking about, there is only one stereocenter in ephedrine!

2. Ephedrine and pseudoephedrine (shown below — it’s the active component of Sudafed) are best described as:

   ![Pseudoephedrine](image)

   - A Enantiomers
   - B Pseudoisomers
   - C Diastereoisomers
   - D Constitutional Isomers
   - E Meso Isomers

3. The specific rotation of the naturally occurring enantiomer of ephedrine is $-6.3^\circ$ — based upon this fact, what can you deduce about the specific rotation of the naturally occurring enantiomer of pseudoephedrine?

   - A It is $+6.3^\circ$
   - B It is $-6.3^\circ$
   - C You can’t know what the value is, but it will be a negative rotation (–)
   - D You can’t know what the value is, but it will be a positive rotation (+)
   - E Absolutely nothing
4. Ibuprofen is a non-steroidal anti-inflammatory drug that has analgesic properties (it’s a painkiller – and the active ingredient in Advil). Only the (S)-enantiomer (shown below) is biologically active, the (R)-enantiomer is not. Assuming that the specific optical rotation of pure (R)-Ibuprofen is –25°, what is the enantiomeric excess of the (S)-enantiomer in a sample of ibuprofen that has a specific rotation of 10°?

\[
\begin{array}{c}
\text{(S)-Ibuprofen} \\
\end{array}
\]

A 70%  
B 60%  
C 50%  
D 40%  
E 30%

5. What is the order of acidity (from lowest \(\text{pK}_a\) value to highest \(\text{pK}_a\) value) of the bold hydrogen (H) atoms shown highlighted in the compounds drawn below?

\[
\begin{array}{cccc}
1 & 2 & 3 & 4 \\
\end{array}
\]

A 2, 4, 3, 1  
B 4, 3, 1, 2  
C 3, 1, 4, 2  
D 3, 4, 2, 1  
E 4, 2, 1, 3

6. The equilibrium constant \((K_{eq})\) for the reaction shown below is...

\[
\begin{array}{c}
\text{Acid} + \text{Base} \rightleftharpoons \text{Conjugate Acid} + \text{Conjugate Base} \\
\uparrow \text{pK}_a = 11 \\
\uparrow \text{pK}_a = 9 \\
\end{array}
\]

A \(-2\)  
B 0.01  
C 2  
D 20  
E 100

7. Which of the compounds drawn below is the strongest base?

\[
\begin{array}{cccc}
A & B & C & D & E \\
\text{NaNH}_2 & \text{CH}_3\text{NH}_2 & \text{CONH}_2 & \text{NH}_3 & \text{NH}_4\text{Cl} \\
\end{array}
\]
8. What is the order of basicity (from most basic to least basic) of the carbon-based anions (carbanions) drawn below?

![Carbanions](image)

A 1, 2, 3, 4  
B 4, 2, 3, 1  
C 4, 3, 2, 1  
D 4, 1, 2, 3  
E 1, 2, 4, 3

9. For the triene shown below, for which double bond(s) is it possible to assign E or Z descriptors?

![Triene](image)

A 1, 2, and 3  
B Only 1 and 2  
C Only 2 and 3  
D Only 2  
E Only 1

10. What is the major product of the reaction shown below?

![Reaction](image)

A 2-chloro-3-methylpentane  
B 2-chloro-2-methylpentane  
C 3-chloro-2-methylpentane  
D 3-chloro-3-methylpentane  
E 1-chloro-1,1-dimethylbutane

**BONUS**: The reaction of 5-hexen-1-ol with a catalytic amount of acid in an inert solvent gives a compound with the molecular formula C₆H₁₂O. Draw what you think the product of this reaction is ON THE FRONT COVER of this quiz in the box provided.