

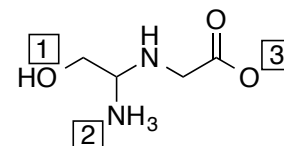
1. For the compound methanol, CH_3OH , which of the following statements is true for the oxygen atom?

- It has no formal charge, but has a slight negative charge, δ^-
- It has no formal charge, but has a slight positive charge, δ^+
- It has a formal +1 charge.
- It has a formal -1 charge.

2. Draw an appropriate Lewis structure nitric acid HNO_3 (which has structure HONO_2) Which of the following statements is true? (Note: hard one, can't do without formal charges.)

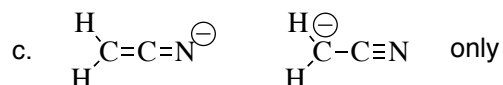
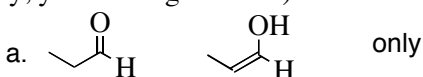
- none of the atoms has any formal charge
- the nitrogen has 4 bonds and a formal charge of +1. One of the two oxygens is doubly bonded with no formal charge; the other is singly bonded with formal charge -1. A second equivalent resonance structure can also be drawn.
- the hydrogen atom is bonded to nitrogen
- the nitrogen has a formal charge of -2
- two of the oxygens are doubly bonded to the nitrogen, and neither has any formal charge. The other oxygen is singly bonded to both the nitrogen and the hydrogen, and also has no formal charge.

3. Circle the **TWO** true statements relative to the structure shown? (Assume enough lone pairs to satisfy octet rule for each atom; but there are some formal charges.)



- For lone pairs, O(1) would have two; N(2) one; and O(3) two
- For lone pairs, O(1) would have two; N(2) none; and O(3) three
- For lone pairs, O(1) would have one; N(2) one; and O(3) three
- For formal charges, O(1) would be neutral; N(2) cation; and O(3) anion
- For formal charges, O(1) would be neutral; N(2) neutral; and O(3) anion
- For formal charges, O(1) would be anion; N(2) cation; and O(3) neutral

4. Which of the following represent pairs of resonance structures? (If you select only one pair when two pairs qualify, you won't get credit.)



- Both a and c.
- Both a and b
- Both b and c.

5. Rank the acidity of the following chemicals, from most acidic to least acidic: (think Anion stability!)

- $\text{HF} > \text{CH}_3\text{CH}_2\text{OH} > \text{CH}_3\text{CH}_2\text{CO}_2\text{H} > \text{CH}_3\text{CH}_2\text{NH}_2$
- $\text{HF} > \text{CH}_3\text{CH}_2\text{CO}_2\text{H} > \text{CH}_3\text{CH}_2\text{OH} > \text{CH}_3\text{CH}_2\text{NH}_2$
- $\text{HF} > \text{CH}_3\text{CH}_2\text{NH}_2 > \text{CH}_3\text{CH}_2\text{CO}_2\text{H} > \text{CH}_3\text{CH}_2\text{OH}$
- $\text{CH}_3\text{CH}_2\text{CO}_2\text{H} > \text{CH}_3\text{CH}_2\text{OH} > \text{CH}_3\text{CH}_2\text{NH}_2 > \text{HF}$

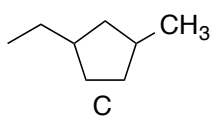
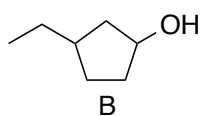
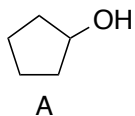
1. Due Prior to Test 1.
2. Can just email me your letter answers.

Organic Chemistry I Jasperse

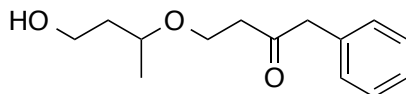
Quiz #2

Name:

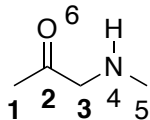
1. Which **one** of the following statements regarding compounds A-C is true?
- B** has the **highest boiling** point and the **highest water solubility**
 - A** is **highest boiling** and has the **highest water solubility**
 - B** is **highest boiling**; **C** has the **lowest water solubility**
 - A** is **highest boiling**; **B** has the **highest water solubility**



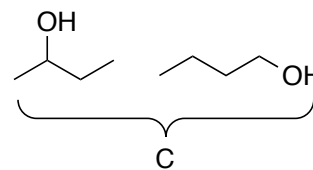
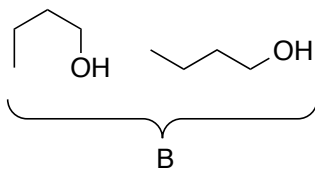
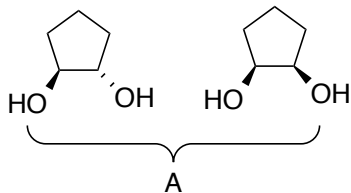
2. Which functional group is **not** found in the following structure?
- alcohol
 - arene (aromatic)
 - ester
 - ketone



3. Which one of the following statements is **true** regarding the structure shown?
- The only sp^2 -hybridized atom is C-2.
 - The only sp^3 -hybridized atoms are C-1, C-3, and C-5.
 - C-2, O-6, and N-4 are all sp^2 hybridized
 - C-2 and O-6 are sp^2 -hybridized; N-4 is sp^3 hybridized.



4. The CCC bond angle (relative to the central carbon) in acetone, CH_3COCH_3 is:
- $\sim 90^\circ$
 - $\sim 109^\circ$
 - $\sim 120^\circ$
 - $\sim 180^\circ$
5. For the 3 pairs of structures shown, which of the following statements is true?
- A** are the same; **B** are the same; **C** are structural isomers
 - A** are stereoisomers; **B** are the same; **C** are structural isomers
 - A** are the same; **B** are stereoisomers; **C** are stereoisomers
 - A** are stereoisomers; **B** are stereoisomers; **C** are structural isomers



1. Due Prior to Test 2.

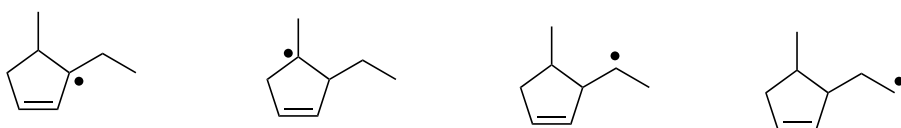
2. Take a cell-phone picture and email me you answers.

Radicals Quiz, Organic Chemistry I – Jasperse

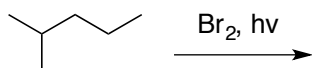
Name:

1. Write the mechanism (propagation steps only!) for the reaction of propane with bromine to give 2-bromopropane. Include detailed arrow-pushing. (Note: use skeleton structure so you can be precise about which C-H bond is getting replaced. Do not use generic “R-H” or “C₃H₇-H”) (2 pts)

2. Rank the stability of the following radicals, from 1 (most stable) to 4 (least stable). (Hint: consideration of 1°, 2°, 3° and allylic versus non-allylic versus vinyl may be at play!)



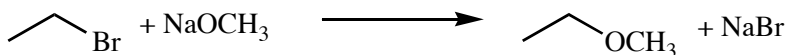
3. Draw the major product of the following reaction. (Note: 3-D drawing is not required).



4. Which of the following statements correctly explains why bromination reactions are more selective than chlorination reactions.

- bromine radical is less stable than chlorine radical, so it is more reactive and less choosy
- bromine radical is more stable than chlorine radical, so it is more reactive and less choosy
- bromine radical is more stable than chlorine radical, so it is less reactive and more choosy
- bromine radical is less stable than chlorine radical, so it is less reactive and more choosy
- relative radical stability is 3° radicals > 2° radicals > 1° radicals when bromine radicals snatch hydrogens from alkanes, but when chlorine radicals snatch hydrogens the resulting alkyl radical stability is 3° radicals < 2° radicals < 1° radicals

5. The following ionic substitution reaction has a rate constant $r=k[\text{CH}_3\text{CH}_2\text{Br}]^1[\text{NaOCH}_3]^1$. (2 pts)



- What will happen to the overall rate if the concentration of bromoethane doubles?
(In each case, don't just say “faster” or “slower”, but say by **exactly how much** the rate will change.)
- If the concentration of NaOCH₃ doubles?
- What will happen to the overall rate if you use the same amount of each reactant, but you double the amount of solvent that you use?

1. Due Prior to Test 2.

2. Take a cell-phone picture and email me you answers.

Stereochemistry Quiz, Organic Chemistry I – Jasperse

10 points

Name:

1. For each structure:

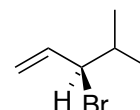
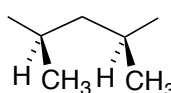
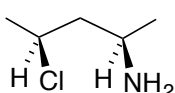
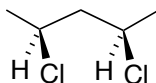
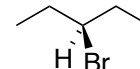
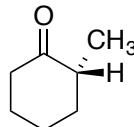
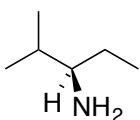
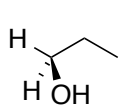
(5 points total)

a) star any chiral carbons,

b) label each chiral carbon as (R) or (S) and

c) indicate any molecules that are chiral. (Either circle them, or write "chiral" beside).

- Two tools for assigning molecular chirality: chiral carbons and planes of symmetry.

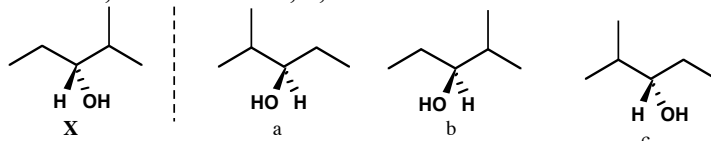


2. Draw the structure for: (1 point, need both perfect)

a. (R)-3-methylhexane

b. (S)-2-chlorobutane

3. Relative to **X**, label each of a, b, and c as an enantiomer to X or as the same as X. (1 pt)



4. Draw all possible stereoisomers of 1,3-dichlorocyclopentane, and label each structure as **A**, **B** etc. (2 pts)

a) Label all chiral C's,

b) write "chiral" by chiral isomers,

c) write "meso" if appropriate, and

d) Classify the relationship between any two structures, for example **A/B enantiomers**, or **A/B diastereomers**, etc.. (For any that are the same, scratch out the duplicate!)

5. Achiral $\text{CH}_2=\text{CHCH}_2\text{CH}_3$ reacts with HCl to produce 2-chlorobutane. (1 point, need all perfect)

a. Is the product chiral? Yes or no

b. Will a solution of the product be optically active or racemic?

c. Will the (S) isomer only, the (R) isomer only, or both isomers form?

- Note: You should not need to look up the reaction to address the stereochemistry ideas!