



Course Name: CHEM 3013: Organic Chemistry Professor/Teacher: Dr. Bolliger

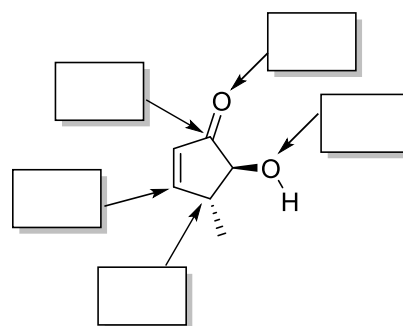
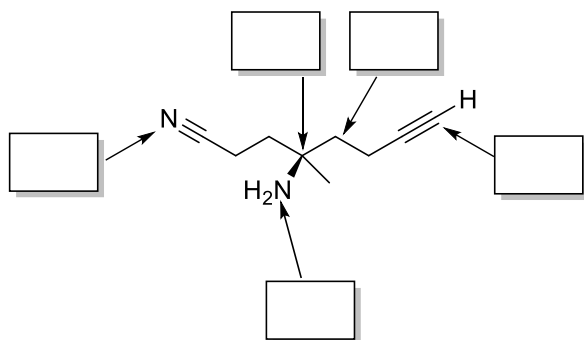
Title of Homework: Homework 1

Name: \_\_\_\_\_ English Name: \_\_\_\_\_

SWJTU ID: \_\_\_\_\_ OSU ID: \_\_\_\_\_ Date: Tuesday, 23 March 2021

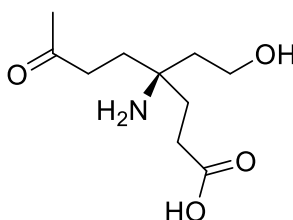
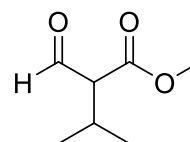
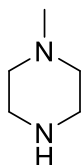
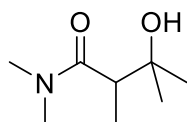
### Question 1

What is the hybridization of the indicated atoms?



### Question 2

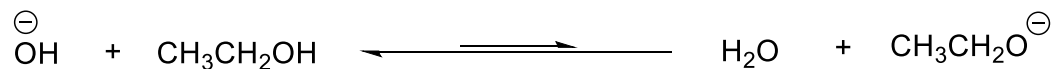
Identify and label all functional groups in the two molecules below (include primary/secondary/tertiary where appropriate).



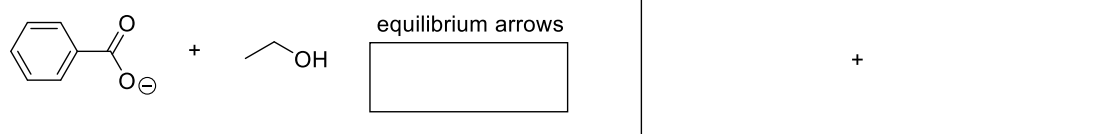
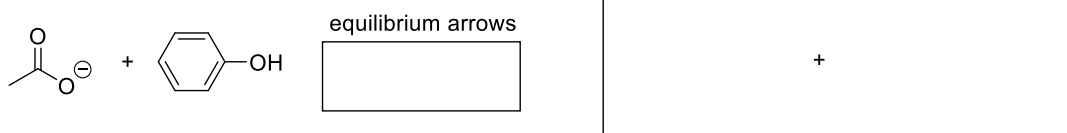
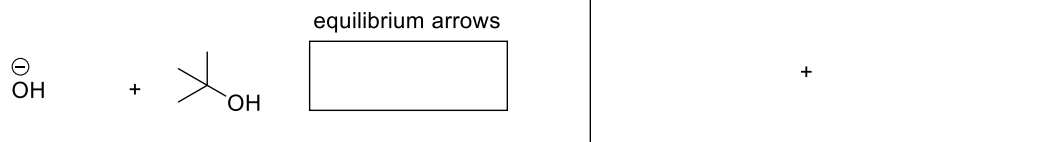


### Question 3

a) Label the acid, base, conjugate acid and base in this reaction.

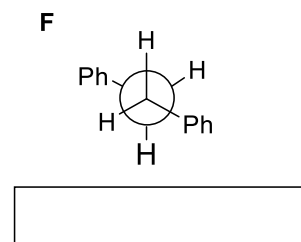
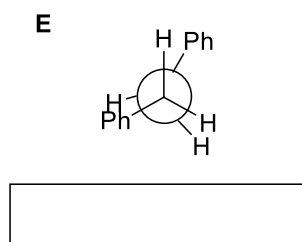
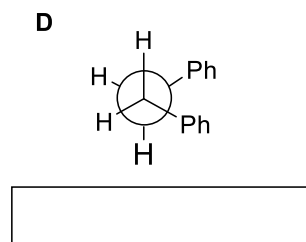
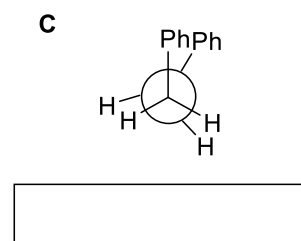
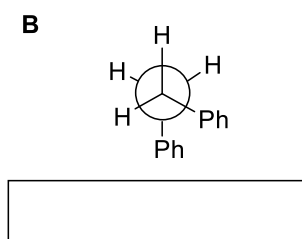
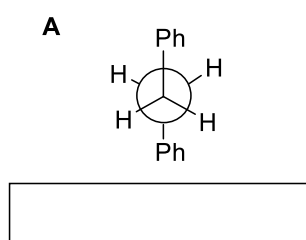


b) Complete the following acid-base reactions and indicate the equilibrium position by using the appropriate equilibrium arrows.



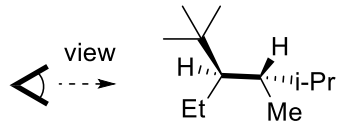
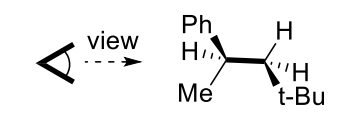
### Question 4

b) Assign the appropriate conformations of 1,2-diphenylethane to the Newman projections A-F.



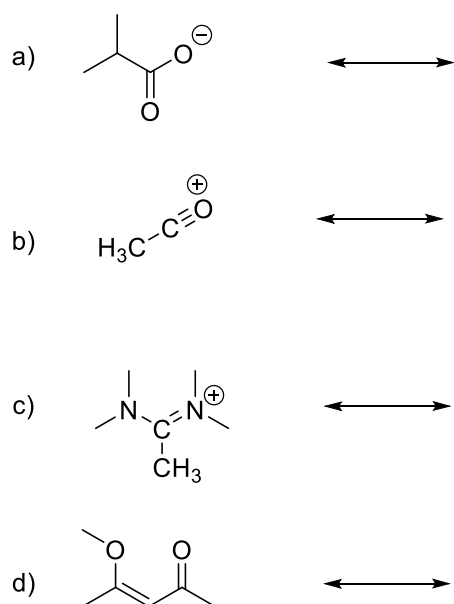
### Question 5

Decide whether the molecules as shown are in a staggered or eclipsed conformation. Draw the Newman projection of the following molecules as indicated and a second Newman projection with the molecules in their most favorable conformation.

<p>a)</p>  <p><input type="checkbox"/> Staggered <input type="checkbox"/> Eclipsed</p>	<p>Newman Projection as indicated:</p>	<p>Newman Projection of lowest energy conformer:</p>
<p>b)</p>  <p><input type="checkbox"/> Staggered <input type="checkbox"/> Eclipsed</p>	<p>Newman Projection as indicated:</p>	<p>Newman Projection of lowest energy conformer:</p>

### Question 6

Complete the following molecules by adding all non-bonding electron pairs. Use curved arrows to indicate the electron movement resulting in the resonance structure. Draw the resonance structures including all non-bonding electron-pairs and formal charges.



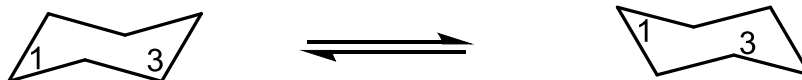


### Question 7

a) Draw the Lewis structure of **trans-1-(tert-butyl)-3-chlorocyclohexane**.

b) Draw the chair form and its flipped chair of **trans-1-(tert-butyl)-3-chlorocyclohexane** by adding the substituents to the ring shown here. Show all the hydrogen atoms bound to carbons 1 and 3 of the ring.

c) Circle the more stable conformer.





### Question 8

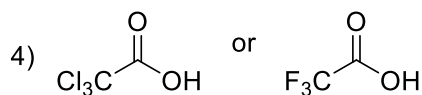
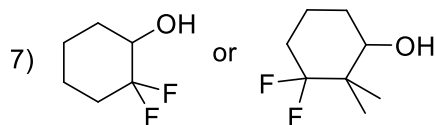
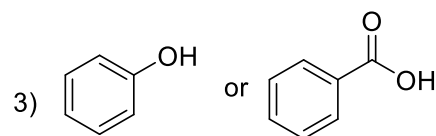
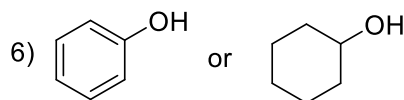
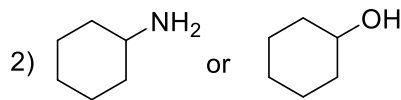
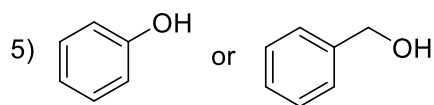
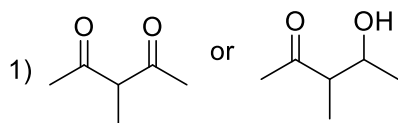
Draw the Lewis structures of the following compounds including all nonbonding electron pairs (lone pairs) and formal charges. Identify the shape around the underlined atom.

	Lewis Structure	Shape around underlined atom
a) $\text{CH}_3\text{CO}_2^-$		$\text{CH}_3\text{C}\underline{\text{O}}_2^-$
b) $\text{BCl}_3$		$\underline{\text{B}}\text{Cl}_3$
c) $\text{NCCH}_3$		$\text{N}\underline{\text{C}}\text{CH}_3$
d) $(\text{H}_3\text{C})_3\text{COH}$		$(\text{H}_3\text{C})_3\text{C}\underline{\text{O}}\text{H}$
e) $\text{N}(\text{CH}_3)_3$		$\underline{\text{N}}(\text{CH}_3)_3$



### Question 9

a) Circle the more acidic molecule of the following pairs.



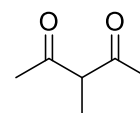
b) In which of these pairs (can be more than one pair) is it an inductive effect that makes one of the molecules more acidic?

\_\_\_\_\_

c) In which of these pairs (can be more than one pair) is it a resonance effect that makes one of the molecules more acidic?

\_\_\_\_\_

d) Draw in or circle the most acidic proton of this compound:



### Question 10

Circle the Lewis acids below.

