Organic Chemistry I, CHM 3140
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Exam I Review (Chapters 1/2/3) – Practice Problems

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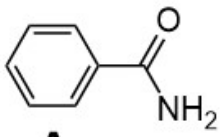
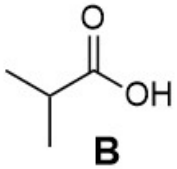
1

Which is the stronger acid? Explain briefly.



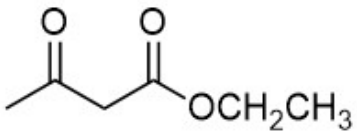
A



B

2

Identify the most acidic proton(s) in the following compound. Explain briefly.



3

Complete the given Lewis structures and provide curved arrows for the proton-transfer reaction that occurs. Predict the products and determine the direction of the equilibrium (forward or reverse favored?). Explain briefly.

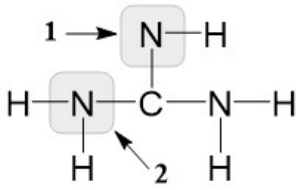
4 Draw the **conjugate acid** for each (complete Lewis structure):

$H^{\ominus}$ H_2O $^{\ominus}CH_2NO_2$ CH_3OCH_3 $H_2C{=}CH_2$

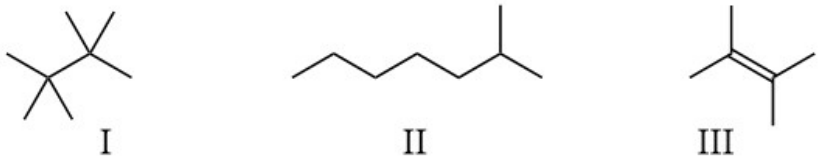
5 Draw the **conjugate base** for each (complete Lewis structure):

H_2O $CH_3\overset{\oplus}{N}H_3$ CH_3NH_2 $HC{\equiv}CH$

6 a) Complete the Lewis structure for guanidine (σ bonds shown)
b) Draw all resonance contributors, rank them & explain.
c) Which is the more basic Nitrogen atom (**1** or **2**)? Explain.



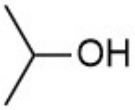
7 Arrange the given compounds in the order of INCREASING boiling point (from lowest bp to highest bp).



I II III

8 Two of the following compounds are miscible in water. Identify the one that is not, and briefly explain.

I



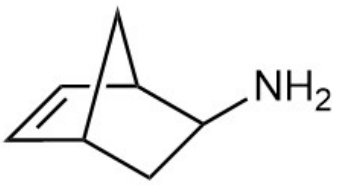
II

III

9 Draw a complete Lewis structure, and provide a 3D sketch.

$NaOCHC(CH_3)_2$

10



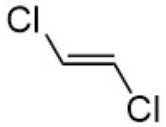
Draw in missing H atoms.

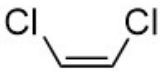
Formula?_____

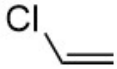
Nitrogen lone pair is: localized / delocalized

Hybridization of N atom?_____

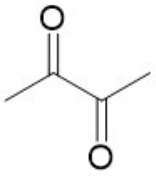
11 Match the following compounds with the given boiling points: 60°C, 49°C, -13°C.







12 Diacetyl occurs naturally in many foods and alcoholic beverages, and it has a buttery flavor. Does pure diacetyl exhibit hydrogen bonding? Explain. Demonstrate the hydrogen bonding that occurs in an aqueous solution of diacetyl.



Diacetyl
(2,3-butanedione)

13 Provide a line drawing for each of the given 3D models (gray = carbon, white = hydrogen, purple = iodine.