Problem Set II Resonance & Orbitals

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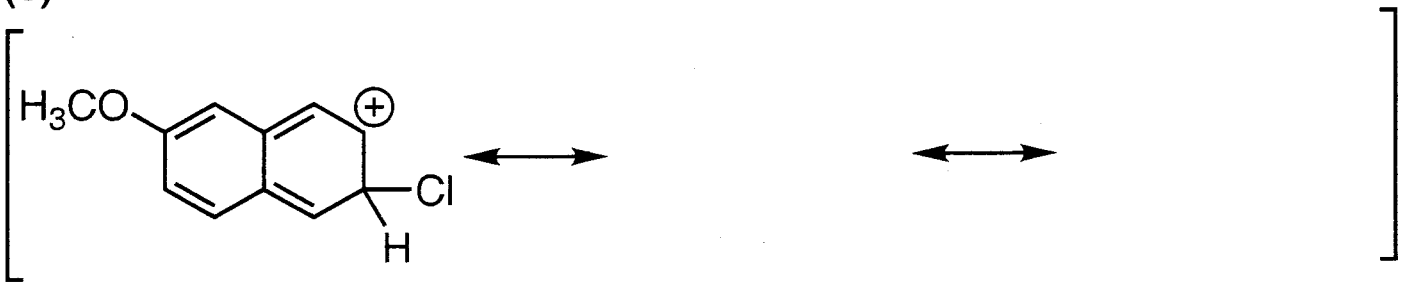
1. Draw two more REASONABLE resonance structures.

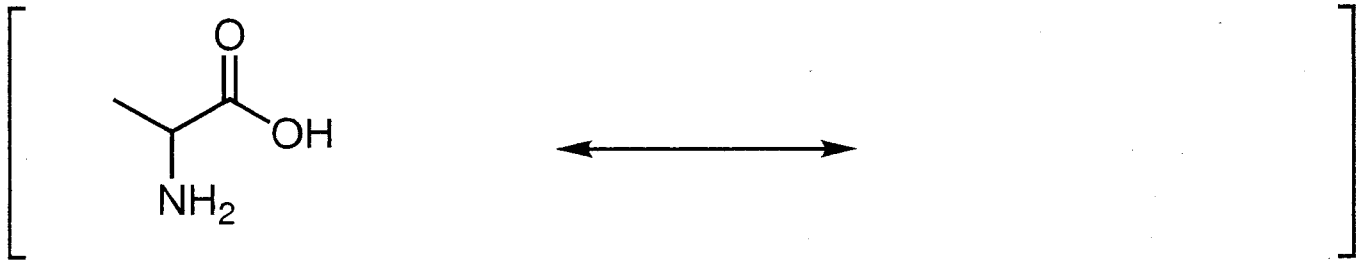
(a)

(b)

(c)



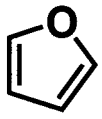
(d)

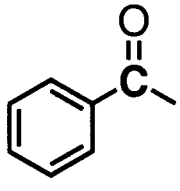


2. Describe the hybridization and the geometry of each bold atom in the following molecules:

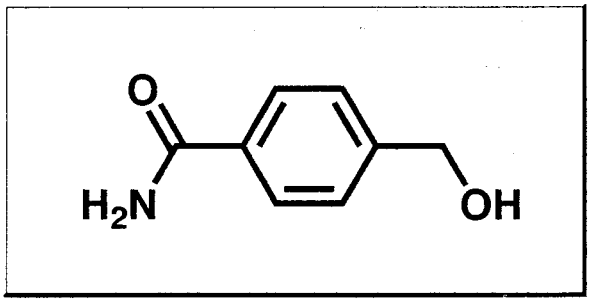
(a) 2-methyl propene, $(CH_3)_2\mathbf{C}{=}CH_2$

(b) 1-buten-3-yne, $H_2C{=}\underset{H}{C}\text{-}\mathbf{C}{\equiv}CH$

(c) furan, 

(f) acetophenone, 

3. A combined problem



(a) Complete the structure by adding all lone pairs and formal charges.

(b) Draw THE MOST IMPORTANT resonance contributor.

(c) The hybridization of the carbonyl carbon is _____.

(d) The hybridization of the carbonyl oxygen is _____.

(e) The hybridization of the alchol oxygen is _____.

(f) How many sp^2 hybidized atoms are in the above molecule (as drawn)? _____

(g) How many lone pairs? _____

(h) The O-C-C(hydroxy group) bond angle is (circle one):
109.5° , < 109.5° , > 109.5°

(i) How many pi bonds are present? _____

(j) Sketch a diagram of the orbitals that overlap to form the carbonyl group.