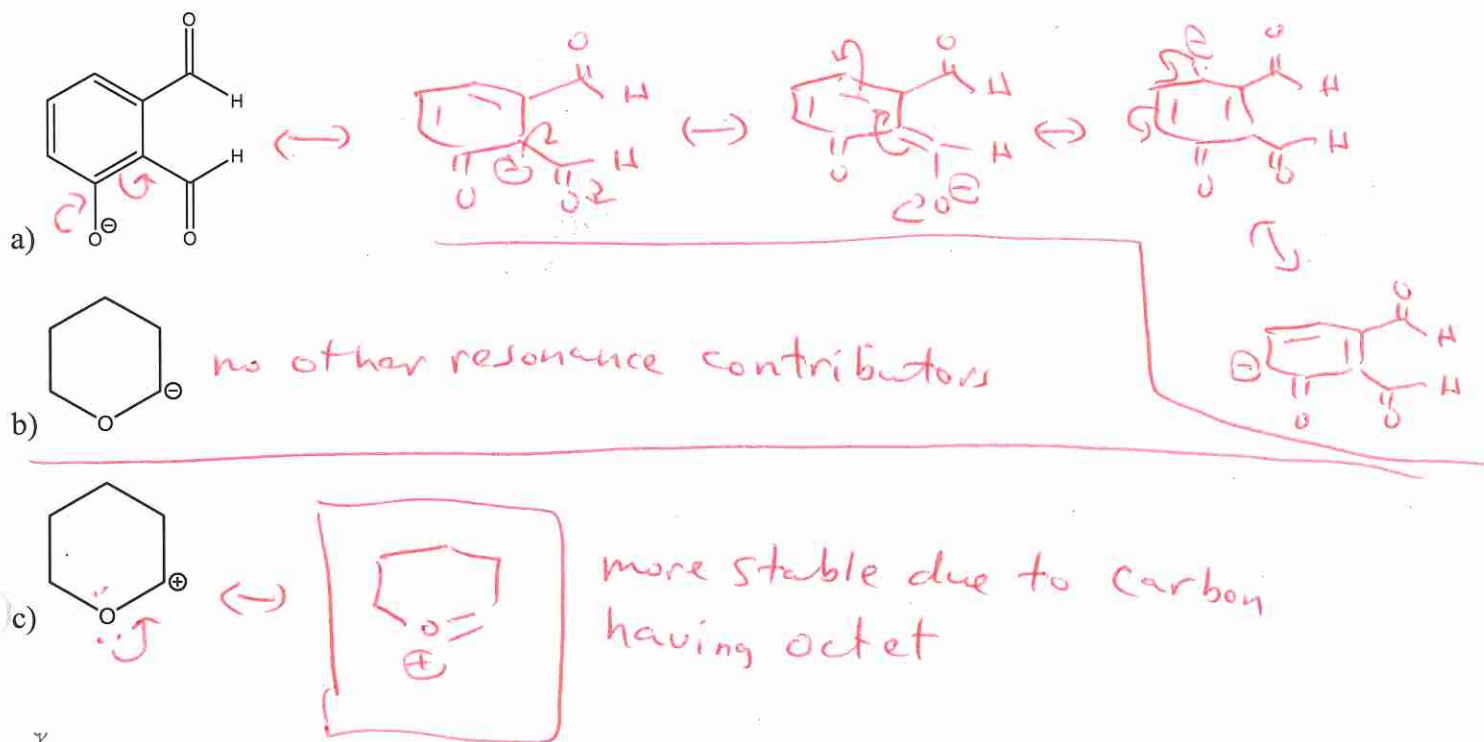


Name: _____

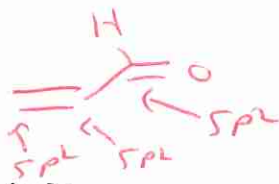
1) Give another resonance structure for the following ions. Write no other resonance contributor if no other resonance contributor exists.



2) a) Give a molecule that has the molecular formula C_3H_4O that has only sp^2 hybridized carbons.

$$C_3H_4O \equiv \frac{C_3H_8}{20} = 4/2$$

of unsaturation



and hydrogen and sp^2 oxygen.

b) Give a constitutional isomer of the molecule in 2a.

a few possibilities



Problems NOT on the quiz.

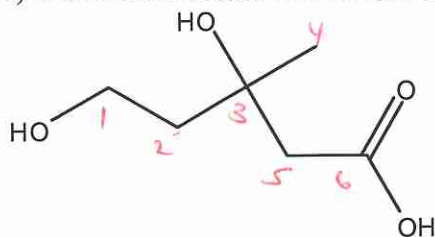
3) How does an atomic orbital differ from a molecular orbital?

atomic orbital covers only a single atom. a molecular orbital covers a whole molecule.

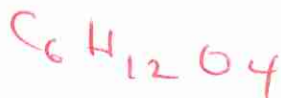
4) How does hybrid atomic orbital differ from an atomic orbital?

hybrid atomic orbitals are mathematical combinations of atomic orbitals $\rightarrow s, p, d, f$

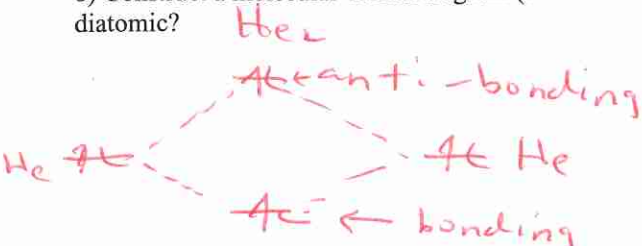
5) What is the molecular formula for mevalonic acid? (shown below.)



10 of unsaturation so $C_6H_{12}O_4$



6) Construct a molecular orbital diagram (similar to Figure 2.5) for diatomic helium (He_2). Why is helium monoatomic instead of diatomic?



bond order = # of electrons in bonding orbital - # of electrons in ant. bonding
for $He_2 = 2 - 2 = 0$ bond order

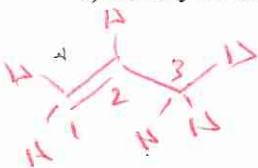
7) Describe the bonding in propane according to the orbital hybridization model.



3 sp^3 orbitals on carbons a, b, & c.

sigma bond between carbon a and carbon b sp^3-sp^3
" " Carbon b and " " sp^3-sp^3

8) Identify the orbital overlaps of all of the bonds in propene ($CH_2=CHCH_3$) and classify them as σ or π as appropriate.



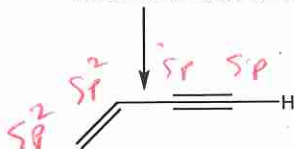
1,2 - π $2sp^2-2sp^2$ & c p orbital
2,3 - σ $2sp^2-2sp^3$
c p orbital

1 & 2 have sp^2 overlapping 1s for c-H

3 has 3 sp^3 overlapping 1s for c-H

carbons a & c have 3 sp^3-1s overlaps
carbon b has 2

9) The hydrocarbon shown, called vinylacetylene, is used in the synthesis of neoprene, a synthetic rubber. Identify the orbital overlaps involved in the indicated bond. How many σ bonds are there in vinylacetylene? How many π bonds?



7 σ , 3 π

sp^2 overlaps sp to form indicated bond.

10) An n-alkane of molecular formula $C_{28}H_{58}$ has been isolated from a certain fossil plant. Write a condensed structural formula for this alkane.

0° of unsaturation

