The University of Zambia
School of Natural Sciences
Chemistry Department
2020/21 ACADEMIC YEAR TERM

CHE1000 - INTRODUCTORY CHEMISTRY

TUTORIAL SHEET 12: **September 2021**
TOPIC: Organic Chemistry Tutorial sheet 1

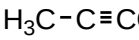
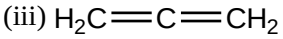
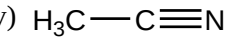
QUESTION ONE

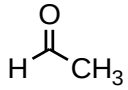
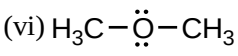
(a) What is 'Organic Chemistry'?

(b) Define or explain the following terms or concepts

i)	Covalent bond	iv)	Formal charge
ii)	Pi bond	v)	Hybridization
iii)	Resonance	vi)	Polar bond

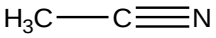
(c) Indicate the type of hybridization of each carbon atom in the following structures:

(i)  (ii)  (iii)  (iv) 

(v)  (vi) 

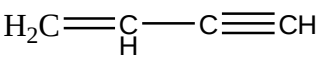
(d) What two hybrid orbitals overlap to form the C-C sigma (σ) bond in acetaldehyde, CH_3CHO

(e) What two hybrid orbitals overlap to form the C-C σ-bond in acetonitrile, shown below:

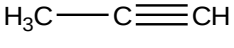


(f) What two hybrid orbitals overlap to form the C-C σ-bond in allene, $H_2C=C=CH_2$

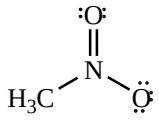
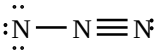
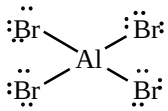
(g) How many sigma bonds and π-bonds are in 1-buten-3-yne?



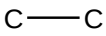
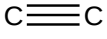
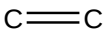
(h) How many σ-bonds and pi-bonds are in propyne?



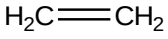
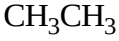
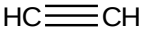
(i) Calculate the formal charge for the following atoms in the compounds below:

(i)  (ii)  (iii)  (iv) 

(j) Arrange the following bonds according to the correct bond length, with the longest first

1.  2.  3. 

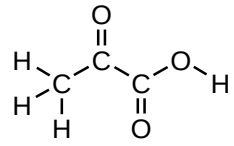
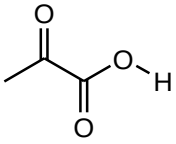
(k) Which of the following hydrocarbons has the strongest bond?

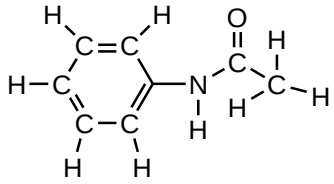
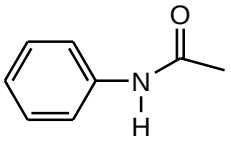
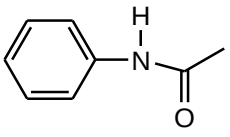
(a)  (b)  (c) 

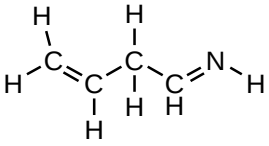
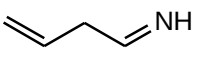
QUESTION TWO

(a) With reference to hybridisation, how many types of carbons are found in millions of its compounds? For each type of carbon, state how many other atoms are bonded to it and also the types of bonds (i.e. single bond/double bond/triple bond), including number of each type of bond.

(b) Identify the types of bonds present as (sp^n-s), (sp^m-sp^n) , (p-p)σ- and π- bonds, in the molecules shown below:

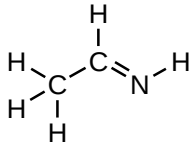
(i)  same as  or $CH_3COCOOH$

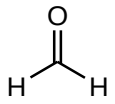
(ii)  same as  or 

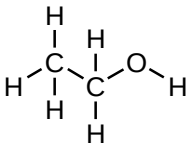
 same as 

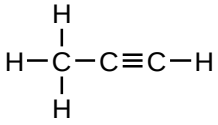
QUESTION THREE

(a) Draw the molecular orbital diagram (picture) for the following molecules:

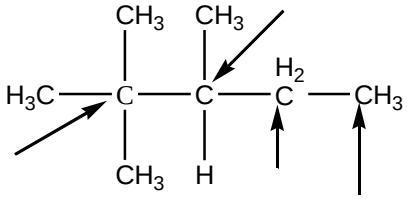
(i) 

(ii) 

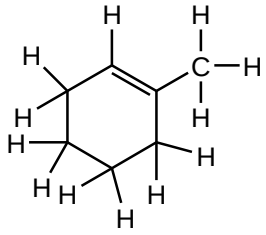
(iii) 

(iv) 

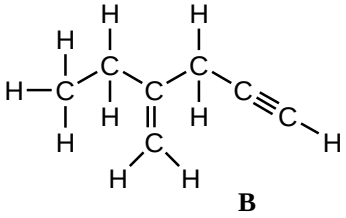
(b) Identify the different types of carbon atoms and also point out which hydrogens are tertiary, secondary and primary in the molecule given below:



(c) Identify the different types of hydrogens in the following molecules, show how many allylic, vinylic, acetylinic hydrogens are in each molecule.



A



B