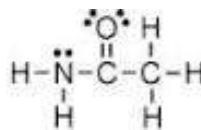


## AP CHEMISTRY UNIT TEST Review sheet

1. The hybridization of Carbon atoms in Methane, Ethane, Ethene(Ethylene), Ethyne (Acetylene), Propene, Benzene,  $C_2H_4Cl_2$   $C_2H_2Cl_4$  is and draw their Lewis Structures. Calculate the number of sigma and pi bonds. Among Ethane, Ethene and Ethyne which C-C bond length and C-C bond energy is maximum.
2. Give few examples of molecules that exhibit resonance and draw structures with the correct geometries
3. Take few examples like  $CO_2$ ,  $SO_2$ ,  $BCl_3$ ,  $PCl_3$  of polar covalent bonds and find which one is more polar. Justify. Also draw their geometries, examine if the molecule has any net bond moment. Justify.
4. Per VSEPR Theory write the examples of the molecules with different molecular geometries starting at 2 electron pairs and all the way up to 7 electron pairs.
5. How will you know if the compound has ionic or covalent or both the bonds?
6. Give examples of molecules with square pyramidal geometry.
7. How is the solubility of ionic and covalent compounds determined? Give examples
8. Justify the geometries of Methane, Ammonia and water molecules and explain the bond angles.
9. Compare the bond dissociation energies of  $F_2$ ,  $Cl_2$ ,  $O_2$ ,  $N_2$  and Justify. What is their bond order and calculate the number of Sigma and Pi bonds.
10. Write the geometries of all different types of hybridizations and give an example each.
11. Among  $NCl_3$ ,  $PCl_3$  and  $CHCl_3$ , which molecules are planar? Draw their geometries.
12. Write different geometries in which all the bond angles are same and bond angles are different. Give examples.
13. Write the Lewis structures of  $O_3$ , Formate ( $HCO_2^-$ ) and calculate their bond orders.
14. How is the bond dissociation and bond energies of reactants and products compared in exothermic and endothermic reactions.
15.  $C \text{ (graphite)} + O_2 \text{ (g)} \rightarrow CO_2 \text{ (g)}$   $\Delta H = -393.51 \text{ kJ mol}^{-1}$ .  
How much is the energy released or absorbed when 0.05 moles of Oxygen is being used in the reaction? If equal masses of Carbon and Oxygen are used initially what are the two substances left at the end of the reaction.
16. In the Born- Haber cycle for the formation of  $NaCl$ , name the steps which are exothermic and endothermic.
17. What is the hybridization, geometries, hybridizations and polarity of  $PCl_3$   $PCl_5$
18. Draw the Lewis structures, hybridizations, geometries, number of sigma and pi bonds in Acetic acid, acetate ion,  $CO_2$ ,  $HCN$ ,  $SO_3$
19. Give few examples of compounds deviating from Octet rule.
20. Give two examples of compounds with both ionic and covalent bonds.
21.  $PCl_5$  exist,  $NCl_5$  does not exist. Justify.
22. Write the Lewis structures of compounds between  $Cl_2$  and  $F_2$ . What is the geometry of  $ClF_3$ . Based on its molecular geometry explain the dipole moment.



23. Ethanamide is an organic compound. Write its Lewis structure.

N-C-C, bond angle is not  $180^\circ$  and the N-H bond angle is not  $90^\circ$ . Estimate their observed bond angles, justify your answers in terms of VSEPR Theory.

24. Draw the Lewis structure and molecular geometry of formaldehyde( $\text{CH}_2\text{O}$ ) and acetaldehyde( $\text{C}_2\text{H}_4\text{O}$ ).

25. Calculate the heat of reaction when Propyl amine ( $\text{C}_3\text{H}_7\text{NH}_2$ ) hypothetically breaks down to Propene or Propylene( $\text{C}_3\text{H}_6$ ) and Ammonia( $\text{NH}_3$ ). Use the bond energies from textbook.

26. Identify the hybridization of Carbon atoms in Ethanol(Ethyl alcohol) and Acetic acid(ethanoic acid). Draw their Lewis structures. What are your observations on the bond length of Acetate ion, justify your answer with the Lewis structures.