

Fall Workshop #1

Question #1

Split into two teams and play "Beat the Clock". You'll have 15 minutes to draw as many Lewis structures as you can. When your team is finished, show your work on the blackboard and discuss. Any unfinished structures can be completed thereafter.

C₂H₄O
C₂H₆
CH₃COCl
CH₆N⁺
HSO₄⁻
CH₃Br
C₄H₁₀
CH₃OCH₂⁺
CH₅O⁺
CH₄N⁻
C₃H₆O₂
C₃H₈O
C₄H₈

If you have difficulty coming up with a Lewis structure, try following the steps below.

Step #1	Do the U calculation from class and determine the valence electron total
Step #2	Make single bond connections among the atoms using central atoms that can have multiple bonding partners – e.g. C, N, O (NOTE: there may be more than one way to do this --- ISOMERS) to come up with an INITIAL GUESS as to the Lewis structure (be sure to complete "octets")
Step #3	Check the formal charge on each atom and for the entire molecule -- if the charge does not agree, it may require you to rearrange atoms or to make additional (pi) bonds up or even a ring to satisfy the octet rule. Count electrons to make sure you have the same number you start with and end with and re-calculate formal charge.

Question #2

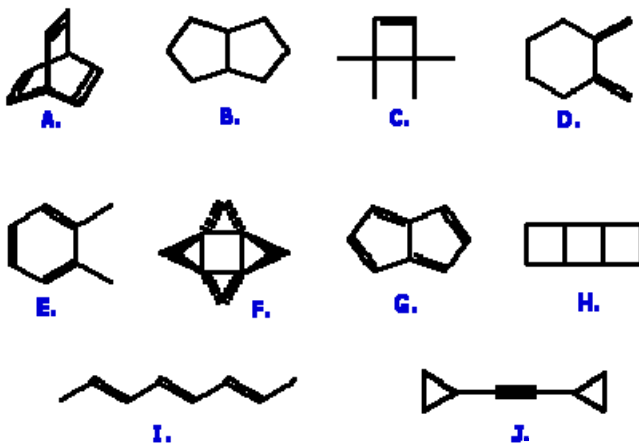
Further Analysis -- revisit your Lewis structures and do the following:

- #1 Did any of you come up with two different structures for the same molecular formula? (These are called ISOMERS)
- #2 Could you draw resonance structures for any of the Lewis structures? If so, show how you did it (remember that you can ONLY move electrons -- no atoms move).
- #3 Given the structures that you came up with, look inside the front cover of your text to determine which functional groups are present. (**NOTE: if you cannot match with any, then your structure is likely not correct.**)

Question #3

Ten hydrocarbon structural formulas are drawn below (A through J). All these hydrocarbons have eight carbon atoms. You should be able to answer the following questions without counting the individual hydrogen atoms in each formula.

- Which compounds have the molecular formula C_8H_{14} ?
- Which compounds have the molecular formula C_8H_{12} ?
- Which compounds have the molecular formula C_8H_{10} ?
- Which compounds have the molecular formula C_8H_8 ?
- Which compound(s) have the greatest unsaturation?

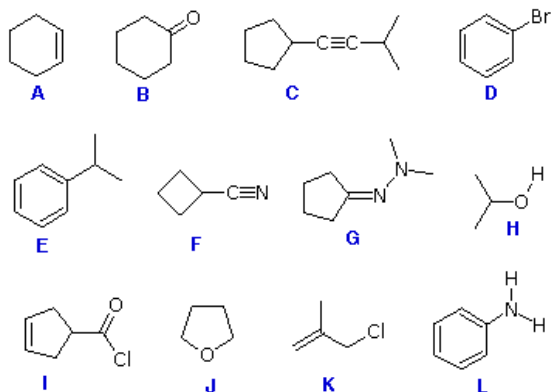


Question #4

For the molecular formula **HCNO** many Lewis structures may be written. Try to write five or six such structures on a piece of paper. Remember that hydrogen can form only one covalent bond. Second row atoms such as carbon, nitrogen and oxygen can form more than one covalent bond, and try to achieve a valence shell electron octet by covalent sharing of electron pairs. HINT: There are a total of NINE possible structures.

Question #5

Examine structural formulas **A** through **L**. Identify those covalent bonds within each structure that would be classified as polar. For this problem we shall assume that C-C and C-H bonds are not polar, because the electronegativity differences are small. The questions posed below require you to enter appropriate letters in the answer box for each question.

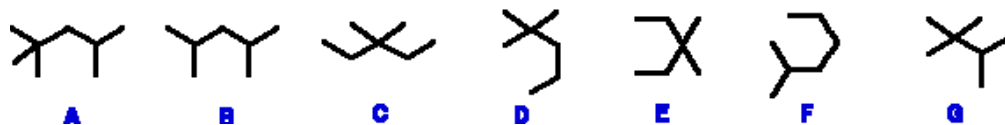


- Which compounds (A through L) have no polar covalent bonds?
- Which compounds have polar single bonds to hydrogen?
- Which compounds have polar single bonds to carbon?
- Which compounds have polar double bonds?
- Which compounds have polar triple bonds?

Question #6

For each question, select one or more letters designating formulas displayed at the bottom of the page. If there is no formula that fits the conditions record “none”.

- Which two line formulas (A to G) are the same?
- Which if any of the line formulas (A to G) is not a constitutional isomer of the others?
- From the list of condensed formulas (H to O) pick that which corresponds to **A**
- From the list of condensed formulas (H to O) pick that which corresponds to **B**
- From the list of condensed formulas (H to O) pick that which corresponds to **C**
- From the list of condensed formulas (H to O) pick that which corresponds to **D**
- Which if any of the line formulas (A to G) is 2,4-dimethylpentane?
- Which if any of the line formulas (A to G) is 2,2,3-trimethylbutane?
- Which if any of the line formulas (A to G) is 2,2-dimethylpentane?
- Which if any of the line formulas (A to G) is 2,2,4-trimethylpentane?
- Which if any of the line formulas (A to G) is 3-ethylpentane?
- Which if any of the line formulas (A to G) is 2-methylhexane?



H $\text{CH}_3\text{CH}_2\text{CH}_2\text{C}(\text{CH}_3)_3$	I $(\text{CH}_3\text{CH}_2)_3\text{CH}$	J $(\text{CH}_3)_3\text{CCH}_2\text{CH}(\text{CH}_3)_2$	K $[(\text{CH}_3)_2\text{CH}]_2\text{CH}_2$
L $(\text{CH}_3)_3\text{CCH}(\text{CH}_3)_2$	M $\text{CH}_3(\text{CH}_2)_4\text{CH}_3$	N $(\text{C}_2\text{H}_5)_2\text{C}(\text{CH}_3)_2$	O $(\text{CH}_3)_2\text{CH}(\text{CH}_2)_3\text{CH}_3$