CH301 Worksheet 7—A practice Quiz 3 Answer Key

1. Classify the bonds in the following compounds as ionic, polar covalent, or non-polar covalent: NH_3, LiF, H_2, respectively.

A. **Polar covalent, ionic, non-polar covalent Correct**
B. Ionic, polar covalent, non-polar covalent
C. Polar covalent, non-polar covalent, ionic
D. Ionic, non-polar covalent, polar covalent
E. Non-polar covalent, ionic, polar covalent

Explanation: Based on the simple rule that $\Delta EN > \sim 1.5$ is ionic, $\sim 1.5 > \Delta EN > 0$ is polar covalent, and $\Delta EN = 0$ is non-polar covalent: The N-H bonds in NH_3 are polar covalent ($\Delta EN = 3.0\text{-}2.2 = 0.8$); LiF is ionic ($\Delta EN = 4.0\text{-}1.0 = 3.0$); and the H-H bond in H_2 is non-polar covalent ($\Delta EN = 0$).

2. In the Lewis structure for acetone, CH_3COCH_3, all of the following bond angles, hybridizations, or electronic geometries are described by some part of the molecule EXCEPT:

A. 120^o
B. sp^3
C. Tetrahedral
D. **90^o Correct**
E. Trigonal planar

Explanation: In the Lewis structure for acetone, the central carbon has three electron-dense regions (one double bond to O and two single bonds to C) and thus has a trigonal planar configuration with 120^o bond angels. The other two carbons are bonded to 4 atoms each (3 H's and 1 C). Thus their configuration is tetrahedral, with sp^3 hybridization.

3. In the Lewis structure for methylamine, CH_3NH_2, all the following bond angles, hybridizations, or electronic geometries are described by some part of the molecule EXCEPT:

A. sp^3
B. Tetrahedral
C. **120^o Correct**
D. 109.5^o
E. None of the above

Explanation: In the Lewis structure for methylamine, the carbon has four electron-dense regions (bonded to 3 H's and 1 N) and thus has a tetrahedral configuration with 109.5^o bond angels. The nitrogen also has 4 electron-dense regions (bonded to 2 H's, 1 C, and has a pair of lone electrons) and thus has a tetrahedral configuration with 109.5^o bond angles.

4. Which of the following best describes the molecular geometry in ozone, O_3?

A. Angular Correct
B. Linear
C. 180^o
D. Pyramidal
E. Both B and C

Explanation: The central oxygen in ozone has two bonds (one single, one double) and a lone pair of electrons and is thus described by AB2U. This gives it the angular geometry.