NAME: **HONORS CHEMISTRY**

SECTION: Advanced Lewis Structures

1. Draw the following Lewis structures. Be sure to count your valence electrons and show all lone pairs!
   1. methanol, CH3OH
   2. Sulfur tetrafluoride, SF4
   3. hydrazine, N2H4
   4. urea, (H2N)CO(NH2) note: the C atom is bonded to both N atoms and the oxygen atom
   5. acrylonitrile, H2CCHCN (the three carbons are side by side)
   6. chlorine trifluoride, CℓF3
   7. hydrogen peroxide, H2O2
2. In the vapor phase, beryllium chloride consists of discrete BeCl2 molecules. Draw a Lewis structure for this compound that involves only single bonds. Draw a second structure using double bonds. For which structure is the octet rule satisfied for the central atom? Use formal charge to determine which structure is preferred.
3. Draw the following Lewis structures.
   1. H3NBF3
   2. Nitric acid, HNO3, in which the three O atoms are bonded to the central N atom and the H atom is bonded to one of the O atoms
   3. Azide ion, N3- (linear). Assign formal charges to each atom.
   4. Chlorate ion, ClO3-  Draw 3 resonance structures.
   5. Benzene, C6H6 (note: the carbons form a 6-membered ring)
   6. Draw three resonance structures for the molecule N2O in which the atoms are arranged in the order NNO. Indicate formal charges.

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SECTION: VSEPR Theory

1. For each of the following molecules, draw an appropriate Lewis structure, then state the number of electron domains around the central atom. Finally, sketch and name the approximate molecular geometry. In each case, the central atom is listed first.

1. SeF6
2. SOCl2
3. ICl3
4. CBr4
5. SO3
6. PF3
7. SO2Cl2
8. SiH4
9. For each of the following molecules, give the number of electron domains around the central atom, and then sketch and name the appropriate molecular geometry. Finally, determine if there are any polar bonds and use the vector sums to determine if the molecule is polar.
   1. OF2
   2. CS2
   3. AsF3
   4. IF5
10. Give an example of a molecule or ion with each of the following structures.
    1. AB3, planar
    2. AB3, pyramidal
    3. AB4, tetrahedral
    4. AB5, trigonal bipyramidal