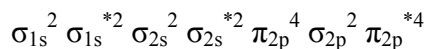


Answer Key Test 4 Chapters 9 & 10 (Silberberg)

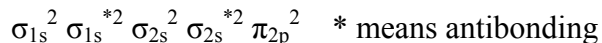
1. B
2. C (HCN and CO₂)
3. D
4. C
5. Polar Covalent HCl (two nonmetals, different electronegativity)
100% Covalent Cl₂, H₂ (diatomic molecules)
Ionic Compounds NaCl (usually metal and nonmetal- electronegativity
difference greater than 1.7)
The difference in electronegativity determines the bond type.
6. HF Greatest difference in electronegativity
7. C
8. E (none are metal/nonmetal combinations)
9. D
Formal Charge = Valence Electrons – Electrons assigned by the
drawing. Choose the drawing with formal charges nearest to zero.
If two drawings have the same formal charges, the drawing assigning
the negative charge to the most electronegative element is favored.
10. C (Resonance – can draw more than one Lewis Dot Structure. Usually
is based on a double bond shifting positions in the molecule.)
11. D (Remember, boron is usually electron deficient and has 6 electrons
around the atom.)
12. $\Delta H = \text{Bonds Broken(reactants)} - \text{Bonds Formed(products)}$
 $= [\text{Br-Br} + 3 \text{ F-F}] - [6 \text{ Br-F}]$
 $= [192 + 3(159)] - [6(197)]$
 $= -513 \text{ kJ}$ Exothermic because of negative sign
13. Molecular Orbital filling order: $\sigma_{1s} \sigma_{1s}^* \sigma_{2s} \sigma_{2s}^* \pi_{2p} \sigma_{2p} \pi_{2p}^*$
 σ all hold 2 electrons, π all hold 4 electrons

F₂ has a total of 18 electrons



Since the last orbital is full with 4, there are no unpaired electrons. To be paramagnetic there must be unpaired electrons. In other words, the σ must contain only one, and the π must contain 1, 2, or 3 but not 4.

B₂ contains a total of 10 electrons:



$$\text{Bond Order} = \frac{\text{Bonding electrons} - \text{Antibonding electrons}}{2}$$

$$= \frac{|6-4|}{2} = 1 \text{ Has a bond order of 1 which means single bond.}$$

As long as a molecule has a bond order greater than zero, it can exist. A bond order of 0 means it does not exist.

14. A

15. D

Additional Questions

16. D

17. C

18. C Longest is NO₃⁻ because it has a bond order of one and a third. The one double bond is actually shared by the three oxygen atoms. In other words, you can draw three resonance structures showing the bond between the three different oxygen atoms. NO⁺ is shortest because it contains a triple bond. The greater the bond order, the shorter the length.

19. E Water has a smaller bond angle than CH₄ because the lone pairs repel more than the bonded pairs of electrons causing the bond angle to be reduced.