Chapter Eight Study Guide

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   Practice Problems
   1. Draw the Lewis Dot structures for the following.
      a. P         b. Cl⁻        c. Ca²⁺        d. MgF₂
2. Draw the Lewis Structures for the following molecules.
   a. PCl₃  b. CHCl₃  c. CO₂
   d. TeCl₄  e. OF₂  f. SF₆
   g. BrF₅  h. SeO₂

3. How many lone pairs (lp) and bonding pairs (bp) does the central atom have in the molecules in problem 2?
   a. PCl₃  b. CHCl₃  c. CO₂
   d. TeCl₄  e. OF₂  f. SF₆
   g. BrF₅  h. SeO₂

4. Which molecule(s) in problem 2 show resonance?

5. What is the ΔH for the following reaction given the table of average bond energies in your book on page 301?
   \[ 2 \text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2 \text{H}_2\text{O}(\text{g}) ; \Delta H = ? \]

6. Of these ionically bonded compounds, which has the lowest lattice energy?
   a. Magnesium Fluoride
   b. Magnesium Chloride
   c. Lithium Oxide
   d. Calcium Bromide
   e. Lithium Sulfide

7. How many lone pairs are on the phosphorus atom in the best Lewis structure for the phosphate ion?

8. Which one of the following bonds is the least polar?
   a. H—Cl
   b. H—S
   c. H—F
   d. H—P
9. Given the bond enthalpies $\text{C—O (360), C=O (707), O=O (498), H—O (464), C—H (414)}$ all in kJ/mol, estimate the $\Delta H$ for the following reaction:

\[ \text{CH}_3\text{OCH}_3(\text{g}) + 3 \text{ O}_2 (\text{g}) \rightarrow 2 \text{ CO}_2 (\text{g}) + 3 \text{ H}_2\text{O(}g) \]

a. -2332 kJ
b. -242 kJ
c. 870 kJ
d. -2106 kJ
e. -602 kJ

10. Of these ionically bonded compounds, which has the largest lattice energy?
   a. Calcium fluoride
   b. Magnesium oxide
   c. Magnesium phosphide
   d. Aluminum iodide
   e. Lithium fluoride

11. How many bonds are in the BF$_3$ molecule? Count single bonds as one bond, double bonds as two bonds, and triple bonds as three bonds.

12. Given the bond enthalpies $\text{C=C (611), C≡C (837), H—H (436), C—H (414)}$ all in kJ/mol, estimate $\Delta H$ for the following reaction:

\[ \text{C}_2\text{H}_2(\text{g}) + \text{H}_2(\text{g}) \rightarrow \text{C}_2\text{H}_4(\text{g}) \]

a. -60 kJ
b. -166 kJ
c. -994 kJ
d. +166 kJ
e. +98 kJ

13. Given the bond enthalpies $\text{C—C (348), C=O (707), O=O (498), H—O (464), C—H (414)}$ all in kJ/mol, compute $\Delta H$ in kJ/mol for the complete combustion of $\text{C}_7\text{H}_{14}$.

\[ \text{a. -3.28 x 10}^3 \]
\[ \text{b. -2.93 x 10}^3 \]
\[ \text{c. -2.57 x 10}^3 \]
\[ \text{d. -2.43 x 10}^3 \]
\[ \text{e. +2.57 x 10}^3 \]

14. How many lone pairs are on Xe in xenon difluoride?