Chapter 9-10 Multiple Choice

1. Which of these compounds is most likely to be ionic?
   A. NCl₃  B. BaCl₂  C. CO  D. SO₂  E. SF₄

2. Which of these compounds is most likely to be covalent?
   A. KF  B. CaCl₂  C. SF₄  D. Al₂O₃  E. CaSO₄

3. Complete this statement: Coulomb’s law states that the magnitude of the lattice energy is …
   A. directly proportional to the product of the charges on the bodies and directly proportional to the distance separating them.
   B. directly proportional to the product of the charges on the bodies, and inversely proportional to the distance separating them.
   C. inversely proportional to the charges on the bodies, and directly proportional to the distance separating them.
   D. directly proportional to the sum of the charges on the bodies, and inversely proportional to the distance separating them.

4. The Lewis dot symbol for the chloride ion is
   A. \( \cdot Cl \cdot \)  B. \( \cdot Cl\cdot \)  C. \( \cdot Cl^- \)
   D. \( \cdot Cl^- \)  E. Cl⁻

5. The Lewis dot symbol for the calcium ion is
   A. \( \cdot Ca\cdot\cdot \)  B. \( \cdot Ca\cdot\cdot \)  C. \( \cdot Ca^{-2} \)
   D. Ca²⁺  E. Ca⁺

6. Which of these ionic solids would have the largest lattice energy?
   A. NaCl  B. NaF  C. CaBr₂  D. CsI  E. CaCl₂

7. Which of these solids would have the highest melting point?
   A. NaI  B. NaF  C. MgO  D. MgCl₂  E. KF

8. Calculate the energy change for the reaction, \( K(g) + I(g) \rightarrow K^+(g) + I^-(g) \), given the following ionization energy (IE) and electron affinity (EA) values.
   \[
   \begin{array}{ll}
   \text{IE} & \text{EA} \\
   K: & 419 \text{ kJ/mol} \\
   I: & 1,010 \text{ kJ/mol} \\
   & 48 \text{ kJ/mol} \\
   & 295 \text{ kJ/mol} \\
   \end{array}
   \]
   A. \(-124 \text{ kJ/mol}\)  B. \(-715 \text{ kJ/mol}\)  C. \(715 \text{ kJ/mol}\)  D. \(1429 \text{ kJ/mol}\)  E. none of these

9. Which of these elements has the greatest electronegativity?
   A. Se  B. Sb  C. K  D. Ga  E. Fe

10. Which of these elements is the least electronegative?
    A. Sr  B. V  C. Ni  D. P  E. I

11. What type of chemical bond holds the atoms together within a water molecule?
    A. Ionic bond  B. Nonpolar covalent bond  C. Polar covalent bond  D. Coordinate covalent bond

12. A nonpolar covalent bond (i.e., pure covalent) would form in which of these pairs of atoms?
    A. Na—Cl  B. H—Cl  C. Li—Br  D. Se—Br  E. Br—Br

13. Which of these covalent bonds is the most polar (i.e., highest percent ionic character)?
    A. Al—I  B. Si—I  C. Al—Cl  D. Si—Cl  E. Si—P

14. In which of these pairs of atoms would the bond have the greatest percent ionic character (i.e., most polar)?
    A. C—O  B. S—O  C. Na—I  D. Na—Br  E. F—F
15. Which of these compounds does not follow the octet rule?
A. NF₃  B. CO₂  C. CF₄
D. Br₂  E. NO

16. Use VSEPR theory to predict the shape of the PCl₃ molecule.
A. linear  B. bent  C. trigonal planar
D. trigonal pyramidal  E. tetrahedral

17. The shape of the ClF₃ molecule is best described as
A. see-saw.  B. trigonal planar.
E. trigonal pyramidal.

18. The F–Cl–F bond angles in ClF₃ are expected to be approximately
A. 90° only.  B. 109.5° only.
C. 120° only.  D. 180° only.
E. 90° and 180°.

19. According to the VSEPR theory, the actual F–As–F bond angles in the AsF₄⁻ ion are predicted to be
A. 109.5°.  B. 90° and 120°.  C. 180°.
D. < 109.5°.  E. < 90° and < 120°.

20. Which one of the following molecules has a zero dipole moment?
A. CO  B. CH₂Cl₂  C. SO₃
D. SO₂  E. NH₃

21. Which one of the following molecules is polar?
A. PBr₅  B. CCl₄  C. BrF₅
D. XeF₂  E. XeF₄

22. In which one of the following molecules is the central atom sp² hybridized?
A. SO₂  B. N₂O  C. BeCl₂
D. NF₃  E. PF₅

23. Which of the following pairs of molecules have the same geometries?
A. SF₄ and CH₄  B. CO₂ and H₂O
C. CO₂ and BeH₂  D. N₂O and NO₂

24. The number of pi bonds in the molecule below is
E. 15.