3 • Molecules and Compounds

1. What is the formula of the ionic compound formed between Mg and Br?
   a) MgBr  
   b) Mg₂Br  
   c) MgBr₂  
   d) Mg₂Br₂  
   e) Mg₂Br₃

2. What is the formula of the ionic compound formed between Ca and P?
   a) Ca₂P₃  
   b) CaP  
   c) Ca₅P₁₀  
   d) CaP  
   e) Ca₃P₂

3. What is the name of the SO₃²⁻ ion?
   a) sulfate  
   b) nitrate  
   c) sulfite  
   d) sulfur trioxide  
   e) hydrogen sulfate

4. What is the correct formula and charge for the chromate ion?
   a) CrO₄²⁻  
   b) CrO₄⁻  
   c) Cr₂O₇²⁻  
   d) Cr³⁺  
   e) Cr⁵⁺

5. Which one of the following elements forms ions with two different valences?
   a) calcium  
   b) arsenic  
   c) iron  
   d) fluorine

6. The correct name for CCl₄ is
   a) carbon(I) chloride  
   b) carbon chloride  
   c) carbon tetrachloride  
   d) monocarbon chloride(IV)  
   e) carbochlorinate

7. The correct formula for hydrogen telluride is
   a) H₂Te  
   b) H₂Te  
   c) H₂Te

8. The correct formula for dinitrogen tetroxide is
   a) NO₂  
   b) N₂O₄  
   c) N₂O₅  
   d) NO₃⁻  
   e) (N₂O)₄

9. The correct name for S₂Cl₂ is
   a) sulfur dichloride  
   b) sulfur(II) chloride  
   c) sulfur(I) chloride  
   d) disulfur dichloride  
   e) sulfur chloride

10. The correct name for H₃P is
    a) hydrogen phosphide  
    b) trihydrogen phosphide  
    c) hydrogen phosphate  
    d) phosphorus trihydride  
    e) hydrogen triphosphate

11. The molar mass of (NH₄)₂S is closest to:
    a) 50 g/mol  
    b) 82 g/mol  
    c) 68 g/mol  
    d) 100 g/mol

12. How many atoms are in 12 molecules of glucose, C₆H₁₂O₆?
    a) 24  
    b) 288  
    c) 2160  
    d) 7.22 x 10²⁴
13. Calculate the number of atoms in $4.0 \times 10^{-5}$ g of aluminum.
   a) $8.9 \times 10^{17}$  
   b) $4.6 \times 10^{19}$  
   c) $6.5 \times 10^{20}$  
   d) $3.8 \times 10^{23}$

14. Which of the following samples contains the smallest number of atoms?
   a) 1 g H$_2$  
   b) 1 g O$_2$  
   c) 1 g O$_3$  
   d) 1 g Cl$_2$

15. What is the mass of one molecule of octane, C$_8$H$_{18}$?
   a) 114 g  
   b) $1.89 \times 10^{-22}$ g  
   c) $1.10 \times 10^{-22}$ g  
   d) $4.32 \times 10^{-23}$ g

16. What is the percent nitrogen (by mass) in ammonium carbonate, (NH$_4$)$_2$CO$_3$?
   a) 14.53%  
   b) 27.83%  
   c) 29.16%  
   d) 33.34%

17. Of the following, the only empirical formula is
   a) N$_2$F$_2$  
   b) N$_2$F$_4$  
   c) H$_2$C$_2$  
   d) HNF$_2$

18. A compound consists of the following elements by weight percent:
   - carbon - 40.0%
   - oxygen - 53.3%
   - hydrogen - 6.7%
   The ratio of carbon : oxygen : hydrogen in the empirical formula is
   a) 1:2:1  
   b) 1:1:1  
   c) 1:1:2  
   d) 2:1:2

19. An organic compound which has the empirical formula CHO has a molar mass of 232. Its molecular formula is:
   a) CHO  
   b) C$_2$H$_2$O$_2$  
   c) C$_4$H$_4$O$_4$  
   d) C$_8$H$_8$O$_8$

20. When CaSO$_4$·yH$_2$O is heated, all of the water is driven off. If 34.0 g of CaSO$_4$ (molar mass = 136) is formed from 43.0 g of CaSO$_4$·yH$_2$O, what is the value of y?
   a) 1  
   b) 2  
   c) 3  
   d) 4