

## UNITS 4, 5, 6 PRACTICE PROBLEMS

1. What is the expected charge on the Ba ion?
2. Which of the following pairs of atoms would not be expected to combine to form an ionic compound?  
a) B and H   b) Na and H   c) Li and Cl   d) Rb and O   e) K and S
3. What is the expected charge on the alkali metals?
4. Which of the following two elements would be expected to form a covalent bond?  
a) Na, O   b) H, S   c) K, Te   d) Mn, F   e) Ba, S
5. Which of the following element is classified as a metal?  
a) N   b) I   c) C   d) H   e) Na
6. Which of the following element is classified as a nonmetal?  
a) Al   b) Cl   c) Ni   d) Ti   e) Mo
7. Which of the following is not a diatomic molecule?  
a) H<sub>2</sub>   b) N<sub>2</sub>   c) K<sub>2</sub>   d) O<sub>2</sub>   e) Cl<sub>2</sub>
8. Which of the following forms a +3 ion?  
a) Na   b) Mg   c) Al   d) Si   e) P
9. Which of the following is a covalent compound?  
a) SCl   b) FrCl   c) CaS   d) BaS   e) KCl
10. Which of the following is an ionic compound?  
a) NO   b) CO   c) OF<sub>2</sub>   d) O<sub>2</sub>   e) K<sub>2</sub>O
11. Which of the following is a nonmetal?  
a) Al   b) Na   c) Cu   d) Cl   e) Mg
12. Which of the following is an alkali metal?  
a) Al   b) Na   c) Cu   d) Cl   e) Mg
13. Which of the following is an ionic compound?  
a) H<sub>2</sub>O   b) CS<sub>2</sub>   c) CaCl<sub>2</sub>   d) CO<sub>2</sub>   e) CH<sub>4</sub>
14. Which of the following is a covalent compound?  
a) NaCl   b) FeCl<sub>3</sub>   c) BaCl<sub>2</sub>   d) NCl<sub>3</sub>   e) AlCl<sub>3</sub>
15. What do you call the following compound: Na<sub>3</sub>PO<sub>4</sub>?  
a) a molecule   b) a polyatomic ion   c) a particle   d) a molecule or a particle
16. Give the ions present and their relative numbers in K<sub>2</sub>SO<sub>4</sub>.
17. Given the following ions, write the correct formula: Ba<sup>2+</sup> and PO<sub>4</sub><sup>3-</sup>
18. What is the correct name for N<sub>2</sub>S?
19. What is the correct name for HCl?
20. What is the formula of the compound trichlorine tetrafluoride?
21. What is the symbol for the chlorite ion?
22. What is the symbol for the sulfite ion?
23. What is the symbol for the chlorate ion?
24. The total number of atoms represented by Ba(H<sub>2</sub>PO<sub>4</sub>)<sub>2</sub> is:
25. What is the chemical formula for lead (IV) sulfide?
26. What is the chemical name of Fe(HSO<sub>3</sub>)<sub>3</sub>?
27. What is the chemical name of BaSO<sub>4</sub>?
28. What is the chemical name of Mg<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>?
29. What is the name of H<sub>2</sub>S?
30. The controversial artificial sweetener saccharin has the molecular formula C<sub>3</sub>H<sub>5</sub>O<sub>3</sub>NS. What is its molecular weight?
31. Cisplatin, an anticancer drug, has the molecular formula Pt(NH<sub>3</sub>)<sub>2</sub>Cl<sub>2</sub>. What is the molecular weight of cisplatin?
32. Nitroglycerin is C<sub>3</sub>H<sub>5</sub>N<sub>3</sub>O<sub>9</sub>. What is the molecular weight of nitroglycerin?

33.  $\text{BaSO}_4$  is given as a thick slurry before X rays are taken of the intestinal tract. How many grams are in a 0.568 mole sample of  $\text{BaSO}_4$ ?
34. Which of the following correctly describes the mole?
- One mole is  $6.022 \times 10^{23}$  atoms of any element
  - One mole is the number of atoms in exactly 12.0 g of  $^{12}\text{C}$
  - One mole of any chemical compound is one mole of its chemical formula unit
  - All of the above are correct
35. What is the mass of  $1.004 \times 10^{23}$  molecules of barium iodide
36. How many moles are in 32.0 grams of  $\text{CH}_4$ ?
37. How many moles of methane molecules,  $\text{CH}_4$ , are in 80 grams of methane?
38. The amount of substance having  $6.022 \times 10^{23}$  of any kind of chemical unit is called a(n):
- mole
  - mass number
  - atomic weight
  - formula
39. What is the molar mass of sodium chloride,  $\text{NaCl}$ ?
40. What is the mass in grams of 10. moles of ammonia,  $\text{NH}_3$ ?
41. What is the formula mass of calcium hydroxide,  $\text{Ca}(\text{OH})_2$ ?
42. What is the formula mass of magnesium hydroxide,  $\text{Mg}(\text{OH})_2$ ?
43. About how many atoms of helium would be found in 2 grams of helium?
44. What is the total number of OXYGEN atoms in the formula of aluminum dichromate,  $\text{Al}_2(\text{Cr}_2\text{O}_7)_3$ ?
45. What is the mass of 4 moles of hydrogen molecules ( $\text{H}_2$ )?
46. What is the mass in grams of 3.00 moles of water molecules,  $\text{H}_2\text{O}$ ?
47. How many moles of water molecules,  $\text{H}_2\text{O}$ , are present in a 42.0 gram sample of water?
48. Calculate the percentage composition of  $\text{Ca}(\text{ClO}_3)_2$ ?
49. What is the empirical formula for  $\text{N}_8\text{O}_4$ ?
50. How many molecules are there in 10.0 g of sodium chloride?
51. How many atoms are in 18 molecules of glucose,  $\text{C}_6\text{H}_{12}\text{O}_6$ ?
52. In 0.250 moles of ethylene glycol (antifreeze),  $\text{HOCH}_2\text{CH}_2\text{OH}$ , there are
53. Which of the following does not describe 56.0 g of butene,  $\text{C}_4\text{H}_8$ ?
- One mole of butene
  - The amount of butene that contains 8.0 g of hydrogen
  - The amount of butene that contains  $8 \times 6.02 \times 10^{23}$  hydrogen atoms
  - The amount of butene that contains 48.0 g of carbon
  - $56.0 \times 6.02 \times 10^{23}$  molecules of butene
54. Sodium cyclamate,  $\text{C}_6\text{H}_{11}\text{NHSO}_3\text{Na}$ , is used as an artificial sweetener in South Africa. If  $\text{C}_6\text{H}_{11}\text{NHSO}_3\text{Na}$  has a molar mass of 201.2 g/mol, how many moles of sodium cyclamate are contained in a 25.6 g sample?
55. How many moles of nitrogen gas ( $\text{N}_2$  molecules) are present in 48.0 grams of nitrogen?
56. Which one of the following has the lightest mass?
- An HF molecule
  - 20.0 g of HF
  - 10.0 mol of  $\text{H}_2$
  - 1 mol of  $\text{F}_2$
  - 1 mol of  $\text{H}_2\text{O}$
57. Which of the following samples contains the smallest number of molecules?
- 1 g phosphorus,  $\text{P}_4$
  - 1 g chlorine,  $\text{Cl}_2$
  - 1 g nitrogen,  $\text{N}_2$

- d) 1 g arsenic,  $As_4$   
 e) 1 g sulfur,  $S_8$
58. One mole is \_\_\_\_.
- the amount of molecules in any substance.
  - the amount of particles in any substance.
  - the amount of atoms in any substance.
  - the amount of ions in any substance.
  - just a number.
59. Calculate the percent nitrogen in ammonium nitrate?
60. Calculate the percentage composition of  $Ca(ClO_3)_2$ ?
61. What is the empirical formula for  $N_8O_4$ ?
62. What is the empirical formula of a compound that contains 80.0% carbon and 20.0% hydrogen by mass?
63. A compound has a molar mass of 118.0 g/mol and the empirical formula  $C_2H_3O_2$ . What is the molecular formula of the compound?
64. What is the coefficient for  $H_2$  when the equation  $Ba + H_3AsO_4 \rightarrow H_2 + Ba_3(AsO_4)_2$
65. Calcium combines with bromine to make calcium bromide. Write the balanced chemical equation for the reaction. What is the coefficient for bromine?
66. According to the following reaction:  $2 Mg(s) + O_2(g) \rightarrow 2 MgO(s)$   
 What is the phase of the product?
67. Barium peroxide,  $BaO_2$ , breaks down into barium oxide and oxygen. Write the balanced chemical equation for this reaction. What is the coefficient for barium oxide?
68. Lithium combines with oxygen to form lithium oxide. Write the balanced chemical equation for this reaction. What is the coefficient for lithium?
69. The decomposition by heating of solid potassium chlorate yields solid potassium chloride and oxygen gas as products. Write a balanced equation for this reaction.
70. Which response below is a correctly balanced equation?
- $Al_2(SO_4)_3 + 6 NaOH \rightarrow Al(OH)_3 + 3 Na_2SO_4$
  - $Al_2(SO_4)_3 + 2 NaOH \rightarrow 2 Al(OH)_3 + Na_2SO_4$
  - $Al_2(SO_4)_3 + 6 NaOH \rightarrow 2 Al(OH)_3 + 3 Na_2SO_4$
  - $Al_2(SO_4)_3 + 5 NaOH \rightarrow 2 Al(OH)_3 + 3 Na_2SO_4$
  - $Al_2(SO_4)_3 + 2 NaOH \rightarrow 2 Al(OH)_3 + 3 Na_2SO_4$
71.  $2 Al + 3 Sn(NO_3)_2 \rightarrow 2 Al(NO_3)_3 + 3 Sn$  This equation is an example of which type of reaction?
- single replacement
  - double replacement
  - combination
  - decomposition
72.  $6 K_2O + P_4O_{10} \rightarrow 4 K_3PO_4$  This equation is an example of which type of reaction?
- single replacement
  - double replacement
  - combination
  - decomposition
73. In class a double displacement reaction was done as a demonstration. A solution of potassium iodide and a solution of lead (II) nitrate were combined. A yellow precipitate formed as a product. What was the precipitate?
74.  $2 H_2(g) + CO(g) \rightarrow CH_3OH(l)$  This equation is an example of which type of reaction?
- single replacement
  - double replacement
  - combination
  - decomposition
75. Write a balanced chemical equation for the following reaction:  
 "Sodium bicarbonate reacts with acetic acid to produce sodium acetate, carbon dioxide and water."
76. What is the percent by mass of nitrogen in ammonium carbonate,  $(NH_4)_2CO_3$
77. Of the following, the only empirical formula is
- $N_2F_2$
  - $N_2F_4$
  - $H_2C_2$
  - $H_2N_2$
  - $HNF_2$
78. Write the correct formula for the compound consisting of the following elements: , C - 40.0%, O - 53.3%, H - 6.7%