

UNITS 4, 5, 6 PRACTICE PROBLEMS - ANSWERS

1. What is the expected charge on the Ba ion?
+2
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?
+2
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) H₂ b) N₂ *c) K₂* d) O₂ e) Cl₂
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) OF₂ d) O₂ *e) K₂O*
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) H₂O b) CS₂ *c) CaCl₂* d) CO₂ e) CH₄
14. Which of the following is a covalent compound?
a) NaCl b) FeCl₃ c) BaCl₂ *d) NCl₃* e) AlCl₃
15. What do you call the following compound: Na₃PO₄?
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 K₂SO₄.
2 K⁺ and 1 SO₄²⁻
17. Given the following ions, write the correct formula: Ba²⁺ and PO₄³⁻
Ba₃(PO₄)₂
18. What is the correct name for N₂S?
dinitrogen monosulfide
19. What is the correct name for HCl?
hydrochloric acid
20. What is the formula of the compound trichlorine tetrafluoride?
Cl₃F₄
21. What is the symbol for the chlorite ion?
ClO₂⁻
22. What is the symbol for the sulfite ion?
SO₃²⁻
23. What is the symbol for the chlorate ion?
ClO₃⁻
24. The total number of atoms represented by Ba(H₂PO₄)₂ is:
15

25. What is the chemical formula for lead (IV) sulfide?
PbS₂
26. What is the chemical name of Fe(HSO₃)₃?
iron (III) bisulfite
27. What is the chemical name of BaSO₄?
barium sulfate
28. What is the chemical name of Mg₃(PO₄)₂?
magnesium phosphate
29. What is the name of H₂S?
hydrosulfuric acid
30. The controversial artificial sweetener saccharin has the molecular formula C₃H₅O₃NS. What is its molecular weight?
135.14 amu
31. Cisplatin, an anticancer drug, has the molecular formula Pt(NH₃)₂Cl₂. What is the molecular weight of cisplatin?
300.1 amu
32. Nitroglycerin is C₃H₅N₃O₉. What is the molecular weight of nitroglycerin?
227.10 amu
33. BaSO₄ 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 BaSO₄?
133 grams
34. Which of the following correctly describes the mole?
a) One mole is 6.022 × 10²³ atoms of any element
b) One mole is the number of atoms in exactly 12.0 g of ¹²C
c) One mole of any chemical compound is one mole of its chemical formula unit
d) All of the above are correct
35. What is the mass of 1.004 × 10²³ molecules of barium iodide?
65.20 g
36. How many moles are in 32.0 grams of CH₄?
2.00 moles
37. How many moles of methane molecules, CH₄, are in 80 grams of methane?
5 moles
38. The amount of substance having 6.022 × 10²³ of any kind of chemical unit is called a(n):
a) *mole*
b) mass number
c) atomic weight
d) formula
39. What is the molar mass of sodium chloride, NaCl?
58.44 g/mol
40. What is the mass in grams of 10. moles of ammonia, NH₃?
170 grams
41. What is the formula mass of calcium hydroxide, Ca(OH)₂?
74 amu
42. What is the formula mass of magnesium hydroxide, Mg(OH)₂?
58.33 amu
43. About how many atoms of helium would be found in 2 grams of helium?
3 × 10²³
44. What is the total number of OXYGEN atoms in the formula of aluminum dichromate, Al₂(Cr₂O₇)₃?
21

45. What is the mass of 4 moles of hydrogen molecules (H_2)?
8 grams
46. What is the mass in grams of 3.00 moles of water molecules, H_2O ?
54.0 grams
47. How many moles of water molecules, H_2O , are present in a 42.0 gram sample of water?
2.33 moles
48. Calculate the percentage composition of $\text{Ca}(\text{ClO}_3)_2$?
19.4% Ca, 34.3% Cl, 46.4% O
49. What is the empirical formula for N_8O_4 ?
 N_2O
50. How many molecules are there in 10.0 g of sodium chloride?
 1.03×10^{23}
51. How many atoms are in 18 molecules of glucose, $\text{C}_6\text{H}_{12}\text{O}_6$?
432
52. In 0.250 moles of ethylene glycol (antifreeze), $\text{HOCH}_2\text{CH}_2\text{OH}$, there are
 1.51×10^{24} molecules
53. Which of the following does not describe 56.0 g of butene, C_4H_8 ?
a) One mole of butene
b) The amount of butene that contains 8.0 g of hydrogen
c) The amount of butene that contains $8 \times 6.02 \times 10^{23}$ hydrogen atoms
d) The amount of butene that contains 48.0 g of carbon
e) $56.0 \times 6.02 \times 10^{23}$ 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?
0.127 mol
55. How many moles of nitrogen gas (N_2 molecules) are present in 48.0 grams of nitrogen?
1.71 mol
56. Which one of the following has the lightest mass?
a) An HF molecule
b) 20.0 g of HF
c) 10.0 mol of H_2
d) 1 mol of F_2
e) 1 mol of H_2O
57. Which of the following samples contains the smallest number of molecules?
a) 1 g phosphorus, P_4
b) 1 g chlorine, Cl_2
c) 1 g nitrogen, N_2
d) 1 g arsenic, As_4
e) 1 g sulfur, S_8
58. One mole is ____.
a) the amount of molecules in any substance.
b) the amount of particles in any substance.
c) the amount of atoms in any substance.
d) the amount of ions in any substance.
e) just a number.
59. Calculate the percent nitrogen in ammonium nitrate?
35.0%
60. Calculate the percentage composition of $\text{Ca}(\text{ClO}_3)_2$?
19.4% Ca, 34.3% Cl, 46.4% O

61. What is the empirical formula for N_8O_4 ?
 N_2O
62. What is the empirical formula of a compound that contains 80.0% carbon and 20.0% hydrogen by mass?
 CH_3
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?
 $C_4H_6O_4$
64. What is the coefficient for H_2 when the equation $Ba + H_3AsO_4 \rightarrow H_2 + Ba_3(AsO_4)_2$
3
65. Calcium combines with bromine to make calcium bromide. Write the balanced chemical equation for the reaction. What is the coefficient for bromine?
1
66. According to the following reaction: $2 Mg(s) + O_2(g) \rightarrow 2 MgO(s)$
What is the phase of the product?
solid
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?
2
68. Lithium combines with oxygen to form lithium oxide. Write the balanced chemical equation for this reaction. What is the coefficient for lithium?
4
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.
 $2 KClO_3(s) \rightarrow 2 KCl(s) + 3 O_2(g)$
70. Which response below is a correctly balanced equation?
a) $Al_2(SO_4)_3 + 6 NaOH \rightarrow Al(OH)_3 + 3 Na_2SO_4$
b) $Al_2(SO_4)_3 + 2 NaOH \rightarrow 2 Al(OH)_3 + Na_2SO_4$
c) $Al_2(SO_4)_3 + 6 NaOH \rightarrow 2 Al(OH)_3 + 3 Na_2SO_4$
d) $Al_2(SO_4)_3 + 5 NaOH \rightarrow 2 Al(OH)_3 + 3 Na_2SO_4$
e) $Al_2(SO_4)_3 + 2 NaOH \rightarrow 2 Al(OH)_3 + 3 Na_2SO_4$
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?
a) *single replacement* b) double replacement c) combination d) decomposition
72. $6 K_2O + P_4O_{10} \rightarrow 4 K_3PO_4$ This equation is an example of which type of reaction?
a) single replacement b) double replacement *c) combination* d) 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? *PbI_2*
74. $2 H_2(g) + CO(g) \rightarrow CH_3OH(l)$ This equation is an example of which type of reaction?
a) single replacement b) double replacement *c) combination* d) 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."
 $NaHCO_3 + HC_2H_3O_2 \rightarrow NaC_2H_3O_2 + H_2O + CO_2$
76. What is the percent by mass of nitrogen in ammonium carbonate, $(NH_4)_2CO_3$ *29.16%*
77. Of the following, the only empirical formula is
a) N_2F_2 b) N_2F_4 c) H_2C_2 d) H_2N_2 *e) HNF_2*
78. Write the correct formula for the compound consisting of the following elements: , C - 40.0%, O - 53.3%, H - 6.7% *1:1:2*