

Atomic Mass Worksheet

1. The element boron consists of two isotopes: ^{10}B which has a mass 10.01 amu. and ^{11}B which has a mass of 11.01 amu. The average atomic mass of boron is 10.81 amu.. What is the percent abundance of each of the two isotopes?
2. There are two naturally occurring isotopes of copper: ^{63}Cu , which has a mass of 62.930 amu. and ^{65}Cu , which has a mass of 64.928 amu. The average atomic mass of copper is 63.54 amu. What is the percent of abundance of each of the isotopes?
3. There are two naturally occurring isotopes of rubidium: ^{85}Rb , which has a mass of 84.91 amu. and ^{87}Rb , which has a mass of 86.92 amu. The average atomic mass of rubidium is 85.47 amu. What is the percent abundance of each of the isotopes?
4. Naturally occurring bromine consists of two isotopes: ^{79}Br , which has a mass of 78.91 amu. and ^{81}Br , which has a mass of 80.916 amu. The average atomic mass of bromine is 79.904 amu. What is the percent abundance of each of the isotopes?
5. If element X consists of 78.7% of atoms with a mass of 24.0 amu, 10.1% of atoms with a mass of 25.0 amu. and 11.2% of atoms with a mass of 26.0 amu. what is the average atomic mass of element X?
6. What is the average atomic mass of element Y if Y consists of 57.25% of atoms with a mass of 120.90 amu. and 42.75% of atoms with a mass of 122.90 amu?
7. If element X consists of 60.4% of atoms with a mass of 68.9 amu. each and 39.6% of atoms with a mass of 70.9 amu. each. What is the atomic mass of element X?
8. If element X consists of 92.0% of atoms with a mass of 28.0 amu. each. 5.0% of atoms with a mass of 29.0 amu. each, and 3.0% of atoms with a mass of 30.0 amu. each. What is the average atomic mass of element X?
9. Chlorine exists in nature as chlorine-35, atomic mass 34.96885 amu, and chlorine-37, atomic mass 36.96590 amu. Its average atomic mass is 35.435 amu. What is the percent abundance of these two isotopes?
10. Calculate the average atomic mass of oxygen. The naturally occurring element consists of 99.759% with a mass of 15.99491 amu., 0.037% with a mass of 16.99914 amu. and 0.204% with a mass of 17.99916 amu.

Naming Worksheet

(From http://www.palomar.edu/chemistry/docs/Name_of_Chemical_Compounds.html)

Name the following compounds:

- | | |
|--|---|
| 1. ZnS _____ | 26. CuCl ₂ _____ |
| 2. MgCl ₂ _____ | 27. PCl ₅ _____ |
| 3. Ca(ClO ₃) ₂ _____ | 28. LiNO ₂ _____ |
| 4. CaSO ₄ _____ | 29. KH ₂ PO ₄ _____ |
| 5. AgNO ₃ _____ | 30. CuCN _____ |
| 6. H ₂ S _____ | 31. KHCO ₃ _____ |
| 7. CaO _____ | 32. NaHSO ₃ _____ |
| 8. H ₂ CO ₃ _____ | 33. Li ₂ HPO ₄ _____ |
| 9. Mg ₃ (PO ₄) ₂ _____ | 34. H ₃ PO ₃ _____ |
| 10. KCl _____ | 35. MgSO ₄ _____ |
| 11. K ₂ O _____ | 36. Ca(IO ₂) ₂ _____ |
| 12. Al(NO ₂) ₃ _____ | 37. SiO ₂ _____ |
| 13. MgO _____ | 38. CuCl _____ |
| 14. SnI ₂ _____ | 39. KClO ₂ _____ |
| 15. AsCl ₅ _____ | 40. CaSO ₃ _____ |
| 16. CuSO ₃ _____ | 41. NaBr _____ |
| 17. HF _____ | 42. P ₂ O ₃ _____ |
| 18. FeSO ₄ _____ | 43. HClO _____ |
| 19. SnCl ₄ _____ | 44. NO ₂ _____ |
| 20. AsCl ₃ _____ | 45. NaH _____ |
| 21. KCN _____ | 46. ZnS _____ |

22. NH_4OH _____ 47. $\text{Pb}(\text{NO}_3)_2$ _____
23. $\text{Fe}(\text{ClO}_4)_3$ _____ 48. H_2Se _____
24. HNO_2 _____ 49. H_3PO_4 _____
25. CS_2 _____ 50. CaH_2 _____

Write the formulas for the following compounds:

51. lithium chloride _____ 76. strontium carbonate _____
52. phosphoric acid _____ 77. calcium nitrate _____
53. boron trichloride _____ 78. disulfur dichloride _____
54. ferric chloride _____ 79. tin (IV) oxide _____
55. carbon tetrachloride _____ 80. sodium bicarbonate _____
56. silver sulfide _____ 81. strontium chlorate _____
57. antimony trichloride _____ 82. aluminum hydroxide _____
58. barium carbonate _____ 83. cadmium nitrate _____
59. iodine monochloride _____ 84. diphosphorus trioxide _____
60. aluminum nitride _____ 85. sodium hydride _____
61. lead sulfate _____ 86. calcium nitride _____
62. ammonium chloride _____ 87. sulfur trioxide _____
63. hydrogen fluoride _____ 88. aluminum nitrate _____
64. hydrobromic acid _____ 89. silver oxide _____
65. tin (II) bromide _____ 90. ammonium phosphate _____
66. cuprous oxide _____ 91. cupric sulfate _____
67. calcium bicarbonate _____ 92. lithium fluoride _____

68. copper (II) cyanide _____ 93. sodium sulfate _____
69. cesium fluoride _____ 94. radium carbonate _____
70. zinc phosphate _____ 95. copper (II) oxide _____
71. dinitrogen pentoxide _____ 96. iron (III) sulfate _____
72. iron (II) sulfate _____ 97. magnesium perchlorate _____
73. magnesium oxide _____ 98. potassium hypochlorite _____
74. hydrogen chloride _____ 99. lithium hydride _____
75. potassium cyanide _____ 100. potassium nitrate _____

Formula Mass

A. Write the steps for calculating formula mass.

B. What is the formula mass for the following formulas? Write all answers in 4 significant digits.

_____ 1. NaCl

_____ 7. copper (II) sulfide

_____ 2. K₂S

_____ 8. magnesium fluoride

_____ 3. Cs₂SO₄

_____ 9. copper (II) nitrate

_____ 4. Pr(OH)₃

_____ 10. iron (II) phosphate

_____ 5. K₄Fe(CN)₆

_____ 11. aluminum nitrate

_____ 6. (NH₄)₂SO₄

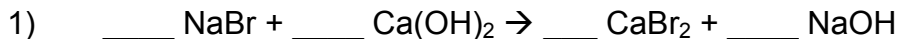
_____ 12. magnesium nitride

Balancing Equations Race

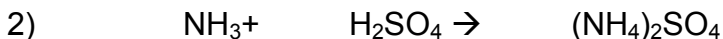
- 1) ___ C₃H₈ + ___ O₂ → ___ CO₂ + ___ H₂O
- 2) ___ Al + ___ Fe₃N₂ → ___ AlN + ___ Fe
- 3) ___ Na + ___ Cl₂ → ___ NaCl
- 4) ___ H₂O₂ → ___ H₂O + ___ O₂
- 5) ___ C₆H₁₂O₆ + ___ O₂ → ___ H₂O + ___ CO₂
- 6) ___ H₂O + ___ CO₂ → ___ C₇H₈ + ___ O₂
- 7) ___ NaClO₃ → ___ NaCl + ___ O₂
- 8) ___ (NH₄)₃PO₄ + ___ Pb(NO₃)₄ → ___ Pb₃(PO₄)₄ + ___ NH₄NO₃
- 9) ___ BF₃ + ___ Li₂SO₃ → ___ B₂(SO₃)₃ + ___ LiF
- 10) ___ C₇H₁₇ + ___ O₂ → ___ CO₂ + ___ H₂O
- 11) ___ CaCO₃ + ___ H₃PO₄ → ___ Ca₃(PO₄)₂ + ___ H₂CO₃
- 12) ___ Ag₂S → ___ Ag + ___ S₈
- 13) ___ KBr + ___ Fe(OH)₃ → ___ KOH + ___ FeBr₃
- 14) ___ KNO₃ + ___ H₂CO₃ → ___ K₂CO₃ + ___ HNO₃
- 15) ___ Pb(OH)₄ + ___ Cu₂O → ___ PbO₂ + ___ CuOH
- 16) ___ Cr(NO₂)₂ + ___ (NH₄)₂SO₄ → ___ CrSO₄ + ___ NH₄NO₂
- 17) ___ KOH + ___ Co₃(PO₄)₂ → ___ K₃PO₄ + ___ Co(OH)₂
- 18) ___ Sn(NO₂)₄ + ___ Pt₃N₄ → ___ Sn₃N₄ + ___ Pt(NO₂)₄
- 19) ___ B₂Br₆ + ___ HNO₃ → ___ B(NO₃)₃ + ___ HBr
- 20) ___ ZnS + ___ AlP → ___ Zn₃P₂ + ___ Al₂S₃

Six Types of Chemical Reaction Worksheet

Balance the following reactions and indicate which of the six types of chemical reaction are being represented:



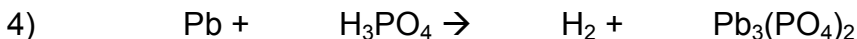
Type of reaction: _____



Type of reaction: _____



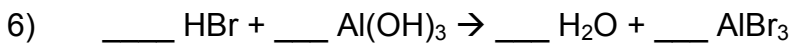
Type of reaction: _____



Type of reaction: _____



Type of reaction: _____



Type of reaction: _____

7) What's the main difference between a double displacement reaction and an acid-base reaction?

8) Combustion reactions always result in the formation of water. What other types of chemical reaction may result in the formation of water? Write examples of these reactions on the opposite side of this paper.

Molar Mass

A. Write the steps for calculating molar mass.

B. What is the molar mass for the following formulas? Write all answers in 4 significant digits.

_____ 1. CO

_____ 7. potassium bromide

_____ 2. SO₂

_____ 8. water

_____ 3. HNO₃

_____ 9. sodium sulfite

_____ 4. Nd₂O₃

_____ 10. ammonium bromide

_____ 5. Fe(C₂H₃O₂)₂

_____ 11. calcium bicarbonate

_____ 6. Sb(NO₃)₃

_____ 12. potassium sulfate

Mole Conversions Worksheet

Mole-Particle Conversions

1. How many moles of magnesium is 3.01×10^{22} atoms of magnesium?
2. How many molecules are there in 4.00 moles of glucose, $C_6H_{12}O_6$?
3. How many moles are 1.20×10^{25} atoms of phosphorous?
4. How many atoms are in 0.750 moles of zinc?
5. How many molecules are in 0.400 moles of N_2O_5 ?

Mole-Mass Conversions

6. How many moles in 28 grams of CO_2 ?
7. What is the mass of 5 moles of Fe_2O_3 ?
8. Find the number of moles of argon in 452 g of argon.
9. Find the grams in 1.26×10^{-4} mol of $HC_2H_3O_2$.
10. Find the mass in 2.6 mol of lithium bromide.

Mole-Volume Conversions

11. Determine the volume, in liters, occupied by 0.030 moles of a gas at STP.
12. How many moles of argon atoms are present in 11.2 L of argon gas at STP?
13. What is the volume of 0.05 mol of neon gas at STP?
14. What is the volume of 1.2 moles of water vapor at STP?

Mixed Mole Conversions

15. How many oxygen molecules are in 3.36 L of oxygen gas at STP?
16. Find the mass in grams of 2.00×10^{23} molecules of F_2 .
17. Determine the volume in liters occupied by 14 g of nitrogen gas at STP.

18. Find the mass, in grams, of 1.00×10^{23} molecules of N_2 .
19. How many particles are there in 1.43 g of a molecular compound with a gram molecular mass of 233 g?
20. Aspartame is an artificial sweetener that is 160 times sweeter than sucrose (table sugar) when dissolved in water. It is marketed by G.D. Searle as *Nutra Sweet*. The molecular formula of aspartame is $C_{14}H_{18}N_2O_5$.
- Calculate the gram-formula-mass of aspartame.
 - How many moles of molecules are in 10 g of aspartame?
 - What is the mass in grams of 1.56 moles of aspartame?
 - How many molecules are in 5 mg of aspartame?
 - How many atoms of nitrogen are in 1.2 grams of aspartame?

Worksheet 7-3

Percent Composition & Empirical Formulas

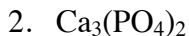
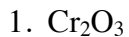
Glencoe Chemistry pp.328-337

Name _____

Period _____

Show your work to receive credit. Circle your final answer.

A. Calculate the *percent composition* for the following compounds.



B. Calculate the *percent by mass* of iron in each of the following compounds.

3. iron (III) oxide

4. iron (II) oxide

C. Determine the *empirical formula* for each compound.

5. A compound contains 0.0130 mol carbon, 0.0390 mol hydrogen, and 0.0065 mol oxygen.

6. A compound consists of 72.2% magnesium and 27.8% nitrogen by mass.

7. Glucose contains 40.0% carbon, 6.7% hydrogen, and 53.3% oxygen by mass.

8. Phosphoric acid is found in some soft drinks. A sample of phosphoric acid contains 0.3086 g of hydrogen, 3.161 g of phosphorus, and 6.531 g of oxygen.

Chemistry I

D. Determine the *molecular formula* for each compound described.

9. A compound has an empirical formula of NO_2 and a molar mass of 92.02 g/mol.

10. A compound has an empirical formula of $\text{C}_2\text{H}_3\text{O}$ and a molar mass of 172 g/mol.

11. Ibuprofen, a common headache remedy, has an empirical formula of $\text{C}_7\text{H}_9\text{O}$ and a molar mass of approximately 215 g/mol.

12. Nicotine is 74.1% carbon, 8.6% hydrogen, and 17.3% nitrogen by mass. Its molar mass is about 160 g/mol.

13. Epinephrine (adrenaline) is a hormone secreted into the bloodstream in times of danger and stress. It is 59.0% carbon, 7.1% hydrogen, 26.2% oxygen, and 7.7% nitrogen by mass. Its molar mass is about 180 g/mol.

E. Questions

14. Can the molecular formula of a compound ever be the same as the empirical formula?
Explain your answer.

15. What is the empirical formula of a compound that has three times as many hydrogen atoms as carbon atoms, but only half as many oxygen atoms as carbon atoms?