Chapter 5 Practice Problem Key

**5.53** Follow the steps in Example 5.2 and balance the equations.



**5.61** Determine the molecular formula of l-dopa. Then calculate the formula weight and molar mass as in Answer 5.59.

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**5.63** Convert all of the units to moles, and then compare the atomic mass or formula weight to determine the quantity with the larger mass.

a. 1 mol of Fe atoms (55.85 g/mol) < 1 mol of Sn atoms (118.7 g/mol)

b. 1 mol of C atoms (12.01 g/mol) < 6.02 × 1023 N atoms = 1 mol N atoms (14.01 g/mol)

c. 1 mol of N atoms (14.01 g/mol) < 1 mol of N2 molecules = 2 mol N atoms (28.02 g/mol N2)

d. 1 mol of CO2 molecules (44.01 g/mol) > 3.01 × 1023 N2O molecules = 0.500 mol N2O (44.02

g/mol N2O) = 22.01 g N2O

**5.67** Convert the grams to moles using the molar mass as a conversion factor.

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**5.69** Multiply the number of moles by Avogadro’s number to determine the number of molecules, as in Example 5.3.

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| a. 2.00 mol × 6.02 × 1023 molecules/mol = 1.20 × 1024 molecules |
| b. 0.250 mol × 6.02 × 1023 molecules/mol = 1.51 × 1023 molecules |
| c. 26.5 mol × 6.02 × 1023 molecules/mol = 1.60 × 1025 molecules |
| d. 222 mol × 6.02 × 1023 molecules/mol = 1.34 × 1026 molecules |
| e. 5.00 × 105 mol × 6.02 × 1023 molecules/mol = 3.01 × 1029 molecules |

**5.73**



a. 12.5 moles of O2 are needed to react completely with 5.00 mol of C2H2.

5.00 mol C2H2 × (5 mol O2/2 mol C2H2) = 12.5 mol O2

b. 12 moles of CO2 are formed from 6.0 mol of C2H2.

6.0 mol C2H2 × (4 mol CO2/2 mol C2H2) = 12 mol CO2

c. 0.50 moles of H2O are formed from 0.50 mol of C2H2.

0.50 mol C2H2 × (2 mol H2O/2 mol C2H2) = 0.50 mol H2O

d. 0.40 moles of C2H2 are needed to form 0.80 mol of CO2.

0.80 mol CO2 × (2 mol C2H2/4 mol CO2) = 0.40 mol C2H2

**5.77** Use the equation to determine the percent yield.



**5.83**

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**5.95** Acetylene is reduced because it gains hydrogen atoms.

**5.107**



a. Calculate the molar mass as in Answer 5.59; the molar mass of DDT = 354.5 g/mol.

b. 18 g of DDT would be formed from 0.10 mol of chlorobenzene.

c. 17.8 g is the theoretical yield of DDT in grams from 11.3 g of chlorobenzene.

d. 84.3%